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SULSA
Scottish Universities Life Sciences Alliance

Bulletin

Issue 1 • May 2009

The Newsletter of the Scottish Universities Life Sciences Alliance

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» SULSA IS SUPPORTED BY

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Our Dynamic Earth, Edinburgh

SULSA Inaugural Symposium: Cell, Systems and Translational Biology

The Scottish research community will be able to find out about SULSA's impact on life sciences research at the Inaugural Research Symposium, which will be held in Our Dynamic Earth, Edinburgh on Wednesday 10th June 2009.

» This one day event will feature talks from international leaders in the three broad research themes of SULSA – cell biology, systems biology and translational biology. Six of the speakers are research professors and readers newly recruited to Scottish Universities by SULSA. The talks will cover a diverse range of topics in fundamental and translational research, from how cells make decisions to brain development and the effects of drug abuse, to cutting-edge approaches in drug discovery.

Keynote » Nobel Laureate Professor Sir Tim Hunt

» We have three exceptional guest speakers, each representing one of the three SULSA themes. Our guest speaker in translational biology is Professor Sir Tom Blundell (University of Cambridge), who is Chair of the SULSA international advisory board. Systems biology is represented by Professor Rainer Breitling (University of Groningen, The Netherlands), who is a leader in the emerging field of metabolomics. Our guest cell biologist, Professor Sir Tim Hunt (Cancer Research UK London Research Institute), is one of the field's most celebrated scientists. In 2001, Tim Hunt was awarded the Nobel Prize in Physiology or Medicine, together with Leland Hartwell and Paul Nurse, for discoveries regarding cell cycle regulation. His Keynote Lecture "Controlling entry into and exit from mitosis" will conclude the scientific programme.

Technology showcase

» In addition to hearing from world-leading researchers, delegates will be able to find out about the cutting edge research facilities that are being made available to all Scottish researchers through SULSA.
(contined over...)

(contined from cover...) Since 2008, SULSA has invested £10.6 million in Scottish research infrastructure, including gigabase-scale sequencing services in Edinburgh and Glasgow, an OMX super-resolution microscope in Dundee, and a state-of-the art metabolomics facility in Glasgow. All SULSA-supported facilities and technology platforms are open to researchers across Scotland and during the symposium there will be an exhibition of the facilities that are now available with facility staff on hand to answer questions about capabilities and access.

FREE registration

» This premiere SULSA event is open to all members of the Scottish life sciences community and registration is free. To register, visit **www.sulsa.ac.uk/symposium**.

Symposium speakers

» Professor Manfred Auer

Manfred Auer is SULSA Chair in Chemical and Translational Biology at the University of Edinburgh. His research is focused on the development and application of miniaturised, ultra-high throughput screening platforms for the identification and validation of lead compounds. His unique integrated platforms operate at the single-molecule and single-cell levels, and combine chemical, biological, and physical approaches to overcome many of the limitations of the current industrial early drug-discovery process. Manfred Auer was previously Executive Director of the Innovative Screening Technologies Unit at the Novartis Institutes of Biomedical Research in Vienna.

» Professor Sir Tom Blundell

Tom Blundell is Sir William Dunn Professor of Biochemistry at the University of Cambridge and Head of the Council of Biological Sciences in Cambridge. His research is focused on the structural biology of cell regulation, structural bioinformatics and applications to drug discovery and medicine. In 1976 he was appointed Professor in Birkbeck College, University of London, and in 1989 Honorary Director, Imperial Cancer Research Fund Unit of Structural Molecular Biology. He also co-founded Astex Therapeutics, which has oncology drugs in early stage clinical trials in USA and UK. Tom Blundell is a member of Academia Europaea, a Fellow of the Royal Society and Fellow of Academy of Medical Sciences. He is also Chair of SULSA International Advisory Board.

» Professor Rainer Breitling

Rainer Breitling's research interests include the development of innovative computational approaches for post-genomic systems biology, statistical methods for high-throughput biological experimentation and the dynamic modelling of cellular systems. He is currently Assistant Professor at the Groningen Bioinformatics Centre at the University of Groningen, The Netherlands. He received his Ph.D. from the Technical University of Munich, Germany, in 2001. Before arriving in Groningen he held postdoctoral positions as a bioinformatician at San Diego State University, USA, and the University of Glasgow.

» Professor Tibor Harkany

Tibor Harkany is SULSA Chair in Cell Biology at the University of Aberdeen. His group studies the developmental organization and functions of the endocannabinoid system using a combination of molecular genetics, neuroimaging, neuroanatomy and electrophysiology approaches. His group are also investigating the neuronal basis of cannabis-induced developmental deficits in the central nervous system. Tibor Harkany received his PhD from the Semmelweis Medical School in Hungary and before coming to Aberdeen was at the Karolinska Institute, Sweden. He was recently recognised as an EMBO Young Investigator. *(See also page 8)*

» Professor Andrew Hopkins

Andrew Hopkins' research is focused on developing novel informatics and experimental methods in drug discovery. His lab consists of an informatics group, that uses chemoinformatics, structural bioinformatics and knowledge discovery techniques in its research, and an experimental biophysics group that specialises in biosensor technologies. After completing his doctoral research in structural biology and drug design at the University of Oxford in 1998, Andrew Hopkins joined the Target Analysis Group at Pfizer, Sandwich, UK, where he designed and constructed major informatics systems to aid drug discovery. Since 2008, he has been SULSA Chair in Translational Biology and Medicinal Informatics at the University of Dundee.

» Professor Sir Tim Hunt

Tim Hunt leads the Cell Cycle Control Laboratory at the Cancer Research UK London Research Institute. His group aims to understand the regulation of the cell-cycle, specifically how cyclin-dependent protein kinases (CDKs) trigger cell cycle transitions, and how the timing of cyclin proteolysis is regulated. Tim Hunt received his PhD from the University of Cambridge in 1968 and discovered the first cyclin molecule in the early 1980s using sea urchin egg as his model organism. Later he showed that cyclins are degraded periodically at each cell division, a mechanism that proved to be of general importance for cell cycle control in all organisms. In 2001, he was awarded the Nobel Prize in Physiology or Medicine, together with Leland H. Hartwell and Sir Paul M. Nurse, for discoveries regarding cell cycle regulation by cyclin and cyclin dependent kinases. He became a fellow of the Royal Society in 1991 and a foreign associate of the U.S. National Academy of Sciences in 1999.

» Dr John Mitchell

John Mitchell's research uses computational techniques to address diverse biochemical and chemical problems. His group have developed the MACiE database of enzyme reaction mechanisms in collaboration with Janet Thornton at the European Bioinformatics Institute, and have analysed the chemical mechanisms of enzyme catalysis. He has also worked extensively on the prediction of molecular properties from chemical structure. Previously, he spent 9 years at University College London before moving to the University of Cambridge in 2000. From August 2009, John Mitchell will be SULSA Reader in Translational Biology at the University of St Andrews.

» Professor Ferenc Nagy

Ferenc Nagy's lab researches the signal transduction pathways and molecular mechanisms by which light and the circadian clock regulates gene expression in plants. He received his Ph.D. in genetics from József Attila University, Hungary. He was an assistant professor in the Laboratory of Plant Biology at the Rockefeller University, USA. Later he worked as group leader in the Friedrich Miescher Institute in Basel, Switzerland and then as General Director of the Agricultural Biotechnology Center in Godollo, Hungary. Ferenc Nagy currently has a joint appointment between the Biological Research Center of the Hungarian Adacemy of Sciences in Szeged and the University of Edinburgh, where he is SULSA Chair in Cell and Systems Biology.

» Professor Peter Swain

Since November 2008, Peter Swain has been SULSA Chair in Systems Biology at the University of Edinburgh. His research group combines mathematical, computational and biological approaches to study the biochemical networks involved in cellular decision making, with the ultimate, long-term goal of producing quantitative, predictive models of eukaryotic cells. Peter Swain received his PhD in mathematics from Imperial College London, and completed postdoctoral positions at the Max Planck Institute for Colloids and Interfaces, Germany, and the Rockefeller University, USA. Before coming to Edinburgh, he was Associate Professor at McGill University, Canada, and a Canada Research Chair in Systems Biology.

Inaugural Research Symposium

Our Dynamic Earth, Edinburgh – Wednesday June 10th, 2009

8–9am Registration

9 – 9.05am Professor Mike Tyers - Director's Introduction

9.05–9.10am Professor David Gani - Scottish Funding Council

SESSION ONE:

Chair Professor Julie Frearson
Translational Biology Director

9.10– 10am **OPENING LECTURE: Professor Sir Tom Blundell (University of Cambridge)**
Genomes, Structural Biology and Drug Discovery: Challenges for Academia and Industry

10–10.35am **Professor Manfred Auer (University of Edinburgh)**
Identification of allosteric small molecular inhibitors for the mRNA stabilizing factor HuR and their use for quantitative characterization of the HuR mechanism

10.35–11am Coffee and poster session

SESSION TWO:

Chair Professor David Leach
Cell Biology Director

11–11.35am **Professor Andrew Hopkins (University of Dundee)**
Translational Biophysics: new approach to drug discovery through networks and allostery

11.35–12.10pm **Dr John Mitchell (University of St Andrews)**
The chemistry of protein catalysis

12.10–12.45pm **Professor Tibor Harkany (University of Aberdeen)**
Endocannabinoids, cannabis and the developing brain

12.45–1.50pm Lunch and poster session

SESSION THREE:

Chair Professor Andrew Millar
Systems Biology Director

1.50–2.25pm **Professor Peter Swain (University of Edinburgh)**
Noise and cellular decision-making

2.25–3pm **Professor Rainer Breitling (University of Groningen)**
Metabolomic Systems Biology: from numbers to networks

3–3.25pm Coffee and poster session

SESSION FOUR:

Chair Professor Mike Tyers
SULSA Director

3.25–4pm **Professor Ferenc Nagy (University of Edinburgh)**
Molecular aspects of light regulated plant growth and development

4–4.05pm **Student poster prize presentation**
(Sponsored by the Journal of Cell Biology and the Journal of Experimental Medicine)

4.05–5pm **KEYNOTE SPEAKER: Professor Sir Tim Hunt (CRUK London Research Institute)**
Controlling entry into and exit from mitosis

5–7pm **Drinks reception**
(Sponsored by Invitrogen)

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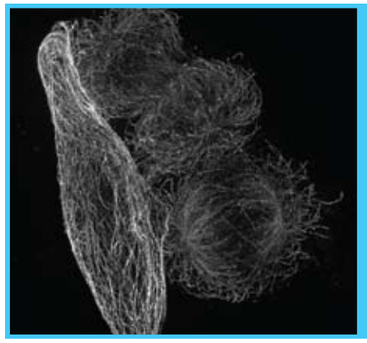
Resolution Revolution



In October last year, the College of Life Sciences at the University of Dundee took delivery of one of only seven OMX super-resolution microscopes in the world. The microscope, which was brought to Dundee by SULSA, is now available to researchers across Scotland. Here, Emma King, SULSA technologist for OMX in Dundee, explains the technology and its capabilities.

» The OMX technology utilises two main imaging protocols: fast, multi-spectral, live-cell 3D imaging and 3D structured illumination microscopy (3D-SIM). These functions allow researchers to explore subcellular structures and processes at greater temporal or spatial resolution than ever before with a light microscope.

Live Cell 3D Imaging

» OMX is a wide-field microscope that uses lasers as a light source to illuminate the sample. The lasers are designed to hit the peak excitation wavelength of common fluorescent proteins used in live-cell imaging such as GFP (488nm) and mCherry (593nm). The OMX light path allows simultaneous acquisition of up to 4 wavelengths at a time; each channel is captured by its own dedicated 16-bit electron multiplying charge coupled device (EMCCD) camera.

The combination of precise stage movements, extremely fast shuttering and short exposure times (due to powerful laser illumination), is coordinated by a digital signal processor that enables the system to acquire up to 160 frames per second. This coordination not only provides researchers with exceptional temporal resolution but can also improve cell viability as samples are exposed to much less light per acquisition, when compared to other systems, minimizing the toxic effects that can be caused by over-exposure. The system is also equipped with a transmitted light source for acquisition of brightfield and DIC images.

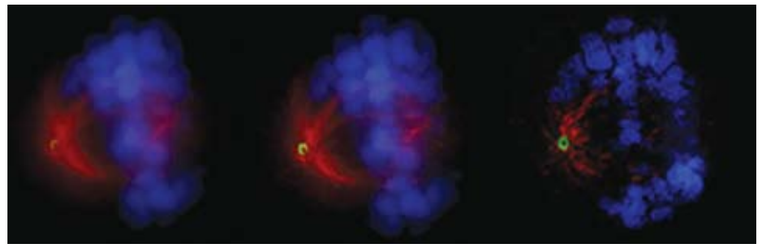
For live tissues and cells that require a controlled environment, the Bioptechs live-cell chamber system is available and has already enabled the successful imaging of living cells of various types on OMX in Dundee, including yeast and cultured human cells.

3D Super-Resolution

» Where OMX comes into its own is through its use of a 3D-SIM protocol to achieve super-resolution images of biological structures. More than 400 hundred years have passed since Galileo's *occhiolino* became the first device to be given the name 'microscope' and for the majority of this time light microscopes have been unable to distinguish between two points closer together than the wavelength of light - the so-called theoretical limit to resolution. The technology used by OMX circumvents this limitation and can generate images with a two-fold improvement in spatial resolution (approximately 100 nm) when compared with a conventional light microscope (230nm). In real terms, this means that a number of important biological structures that were once indistinguishable from one another can now be identified as separate entities and detailed structures can be revealed, as demonstrated by Schermelleh et al. (*Science, 2008*) in their studies of the nuclear periphery.

above » The team responsible for the OMX in Dundee (from left) Drs. Emma King, Paul Goodwin (Applied Precision), Sam Swift and Jason Swedlow

top » HeLa cell microtubules imaged by 3D-SIM



above » The same HeLa cell imaged using conventional microscopy (left), after deconvolution (middle), and using the OMX microscope 3D-SIM protocol and reconstruction (right). Microtubules are stained red, pericentrin green and DNA blue.

In designing the OMX, the microscope's developers have managed to manipulate light, using a diffraction grating, so it is focused into a sinusoidal pattern on the specimen rather than a single uniform beam. When this patterned light is combined with an unknown sample structure a moiré pattern is generated that contains more resolvable features than can be detected in the original sample.

Currently, the OMX in Dundee is set-up to image up to three fluorophores, which can be excited by the 405nm, 488nm and 593nm lasers present on the system. It is the only microscope of its kind capable of 3-colour 3D-SIM in Europe. Each optical section is imaged 15 times in each channel as the diffracted light pattern is shifted laterally and rotated to achieve the best possible resolution in X and Y. By imaging multiple cross-sections, 125nm apart, the extra resolution in Z is achieved. By computationally removing the known diffracted light patterns from the observed, researchers are left with information that can be transformed into a higher resolution image.

So far, we have used the 3D-SIM protocol to image a variety of sample structures from kinetochores and mitotic spindles in human cells to synapses in *Drosophila* neurons. Future plans include the study of protein accumulation in bacteria and cell structure in the mouse gut epithelium.

Technical Support

» As the SULSA technologist responsible for the OMX facility in Dundee, my role is to assist scientists by providing advice and support on sample preparation and OMX image acquisition. I'm looking forward to the challenge of working on a wide-range of projects with users from across Scotland. During April and May, I will be visiting SULSA universities to give a presentation on OMX capabilities and to meet with prospective users (see **www.sulsa.ac.uk** for dates and further details).

» For more information on how OMX works, how to book time on the system, the charging policy and to see example images please visit **http://microscopy.lifesci.dundee.ac.uk/omx**

CONTACT

» Dr Emma King, SULSA Scientific Officer for OMX, University of Dundee
email: **e.m.j.king@dundee.ac.uk**

FURTHER READING

» Schermelleh, et al. **Science 320, 1332** (2008)

Funding Opportunity

High throughput screening: call for proposals

» Support is now available through the SULSA Translational Biology Theme for researchers seeking to carry out high throughput small molecule screening of potential drug targets. The deadline for this year's applications is 22nd June 2009.

Several Scottish universities offer excellent facilities and expertise for high throughput small molecule screening. But investigators can struggle to find sources of funding for screening, particularly when their research is at an early stage. The SULSA High Throughput Screening Fund was established to help bridge this gap in early drug discovery in Scottish Universities.

The choice of facility or laboratory for running the proposed screen is at the discretion of the applicant. In 2008, successful applicants chose to run their screens in collaboration with the Scottish Hit Discovery Facility (Dundee), Strathclyde Innovations in Drug Research, and the Centre for Biomolecular Sciences (St Andrews). Further information about the various drug screening facilities and their capabilities are available through the SULSA website **www.sulsa.ac.uk**.

The successful 2008 projects – seven projects in total from six different Scottish universities – tackled diverse biological targets for a wide range of diseases and indications, including cancer, inflammatory disease, pain associated with nerve damage, trypanosomiasis (sleeping sickness) and pneumococcal infection.

The application form and full guidelines are available for download on the SULSA website. All proposals should show a contribution of matching funds at a minimum level of 20%.

» For further information, please contact the SULSA Translational Biology Theme Administrator, Janette Moore.
email: **j.m.moore@dundee.ac.uk**
phone: **+44 (0)1382 384232**

Glasgow's IVIS Spectrum Imager

A system for non-invasive imaging of bioluminescent and fluorescent reporters in living animals is now available at the University of Glasgow. This state-of-the-art facility is supported by a dedicated SULSA technologist and is open to users across SULSA.

» The IVIS Spectrum imager, which is based within the Faculty of Biomedical and Life Sciences, can be used for in vivo monitoring of disease, cell migration and gene expression. The high efficiency filters allow data to be collected and measured across the blue to almost infrared wavelength spectrum, producing quantifiable images from bioluminescent and fluorescent reporters.

When using fluorescent reporters there are the additional options of epi-illumination (light from above), which allows data to be collected from sources close to the surface, and trans-illumination (light from below), which minimises auto-fluorescence.

The system's software can create 3D tomography images that allow source localisation as well as anatomical analysis using a 3D mouse atlas. Other features include spectral un-mixing to remove unwanted auto fluorescence, and the ability to observe and separate several fluorescent reporters within the same animal. The software is intuitive to use, however, there is on site technical assistance to help with familiarisation of the settings.

SULSA researchers outside of University of Glasgow should contact SULSA Technologist, Ryan Ritchie, in the first instance to discuss on-site experimental facilities, which are available at local user rates.

» For further information about the imager's capabilities, charges and to book visit the IVIS facility website at **www.gla.ac.uk/faculties/fbls/ss/ivisspectrumimagingsystem/**

Image courtesy of Caliper Life Sciences

CONTACT

» Ryan Ritchie, SULSA Technologist for IVIS Spectrum Imaging, University of Glasgow
email: **r.ritchie@bio.gla.ac.uk**

» SULSA in the News

SULSA Professor reveals possible cause of link between Alzheimer's and epilepsy

» On 19 March 2009, *BBC News online* reported that an international team co-headed by SULSA Professor Tibor Harkany at the University of Aberdeen might have discovered why epilepsy is more prevalent in Alzheimer's patients. The findings published in the *Journal of Neuroscience* shows that beta-amyloid protein, which accumulates in Alzheimer's plaques, causes hyper-excitability of neurons. Rebecca Wood, chief executive of the Alzheimer's Research Trust, said: "One third of Alzheimer's patients have some degree of epilepsy, and some people who live with the disease are 80 times more likely to suffer seizures than the general population. This research builds greatly on our understanding of the connection between the two conditions."

» see
http://news.bbc.co.uk/1/hi/health/7948465.stm

SULSA OMX microscope in the spotlight

» On 15 February 2009, the *Scotland on Sunday* newspaper highlighted exciting research areas that could benefit from the new SULSA OMX microscope at the University of Dundee. Professor Jason Swedlow at the University of Dundee explained how the technology, which reveals structures with twice the resolution previously possible, has the potential to provide new understanding of human disease processes and reveal new targets for treatment. Professor Sir David Lane, Cancer Research UK's chief scientist based at the University of Dundee, said "This is an exciting acquisition for the University of Dundee and great news for cancer research in the UK".

» see
http://scotlandonsunday.scotsman.com/health/Super-microscope-gives-new-insight.4981998.jp

» New Faces

Prof JULIE FREARSON

Prof PETER McCAFFERY

Dr FRANK GUNN-MOORE

Prof MIKE FERGUSON

» In January 2009, one of SULSA's founders, **Professor Pete Downes**, was appointed Interim Principal of the University of Dundee. Pete has stepped down from the SULSA Executive Committee and from his position as Chair of the Translational Biology Theme Directorate. He is replaced by two Dundee colleagues. **Professor Julie Frearson** (University of Dundee) is the new SULSA Translational Biology Theme Director. Julie is a Chair of Biotechnology at Dundee, and Head of the Scottish Hit Discovery Facility, part of the Drug Discovery Unit. Julie was recruited to the University from BioFocus, where she was Director of Biology. **Professor Mike Ferguson** (University of Dundee) replaces Pete Downes as the SULSA Executive Committee member for the University of Dundee. Mike is Professor of Molecular Parasitology and the Dean of Research at the University's College of Life Sciences. Mike's multi-disciplinary research interests include the structural, biosynthetic and metabolic repertoire of glycoproteins associated with parasite infection.

» **Professor Peter McCaffery** (University of Aberdeen) is Chair of the recently formed SULSA Facilities Management Committee. The FMC works with the directors of SULSA-funded facilities to ensure fair access and charges for researchers at SULSA universities. Peter's research interests centre on the regulation of brain function by retinoic acid. He obtained a Ph.D. from Otago University, New Zealand in 1987. After post-doctoral research at Harvard Medical School he became Assistant Professor in the Department of Psychiatry, Before moving to the University of Aberdeen in 2006, Peter was Associate Professor in Cell Biology at Massachusetts Medical School. For more information and to contact the FMC visit **www/sulsa.ac.uk/facilities**

Dr JENNIFER BELL

» In October 2008,**Dr Jennifer Bell** took up the position of Executive Officer for SULSA. Jennifer manages the central SULSA administration, heads communications efforts, and works with the Director and Executive Committee to develop SULSA. She obtained a PhD in immunology from the University of Edinburgh in 2001. Previously she was Executive Editor of the *Journal of Experimental Medicine* in New York, and a founding editor of *Nature Reviews Immunology*.

» **Dr Frank Gunn-Moore** (University of St Andrews) has recently replaced Dr Judith Sleeman as the St Andrews representative on the SULSA Cell Biology Theme Directorate. Frank's research interests are focused on the factors that promote correct neuronal function. As part of the St Andrews biophotonics collaboration, his group are also investigating how light can influence and manipulate cellular and sub-cellular biological material. Frank gained his PhD from the University of Cambridge, and undertook post-doctoral research at the University of Bristol and the University of Edinburgh.

Dr IAN STANSFIELD

» **Dr Ian Stansfield** (University of Aberdeen) replaces Peter McCaffery as the Aberdeen representative on the SULSA Systems Biology Theme Directorate. Ian's research interests include the mechanism of protein synthesis in eukaryotic cells, and in the control of gene expression at the level of mRNA translation. Ian received his PhD from the University of Sheffield where he had studied cytochrome P450 enzymes in the yeast *Saccharomyces cerevisiae*. His post-doctoral research was carried out at the University of Kent and in 1996 he was appointed a Lecturer at the University of Aberdeen.

SULSA PhD studentships projects still available » Visit **www.sulsa.ac.uk**

Profile » Tibor Harkany

In 2007, neurobiologist Tibor Harkany arrived at the University of Aberdeen, from the Karolinska Institute in Stockholm, to take up the position of SULSA Chair in Cell Biology. His research has revealed the fundamental role of endocannabinoids in the developing nervous system. Here he talks about his science, his inspirations and his reasons for coming to Aberdeen.

Can you tell us about your early career and how you became interested in the endocannabinoid system?

» I was educated in Hungary, where I studied molecular biology and biotechnology at the University of Szeged before going on to complete a PhD programme at the Semmelweis Medical School in Budapest. Initially, I worked on the molecular mechanisms behind cell death in Alzheimer's disease. I'd known about the existence and basic functions of endocannabinoids in the brain for a long time but didn't start studying them until 2003. The spark came when Yuri Zilberter (at that time also working at the Karolinska Institute), a great colleague and friend, asked whether I could help him with a neuroanatomy problem that involved localizing cannabinoid receptors in the brain. I quickly came to realise the limited knowledge that existed on how endocannabinoids may affect brain development. From then on, it was a clear path for me to follow.

Apart from Yuri Zilberter, who are the scientists who have most influenced you?

» Karoly Gulya (University of Szeged, Hungary), my first mentor, effectively exposed me to a new world and made me understand that I needed to be methodological and precise to do research well. I think I have learnt the most from Patrik Ernfors at the Karolinska Institute in Stockholm. He allowed me to take my own path, and supported my interests. He also transformed my view on how research should be done and showed me that a good scientist needs to have two essential characteristics: a 'think big and reach long' attitude and an unbreakable belief in their ability to outpace competitors. I have also learnt a lot from Tomas Hökfelt (Karolinska Institute) - not only about brain anatomy but also on how to help young, upcoming scientists, and how to remain collegiate in the competitive harsh reality of the scientific community.

What are the big picture questions that you are trying to answer in your research?

» Right now, we are working on basic questions. From a developmental point of view, we are asking how neuronal networks become organized and reach functional maturity in the brain and how these processes are impaired by maternal drug exposure. We are also trying to understand which specific steps of the pathological process in Alzheimer's disease cause the breakdown of communication between neurons. I think we must explore multiple fields to really understand basic concepts of how the brain functions.

Which of your discoveries has had the biggest impact on your field?

» Our discovery that endocannabinoids have discrete and important functions in the developing nervous system (Berghuis et al., 2005; Berghuis et al., 2007) was unexpected and has provided a new direction to the whole endocannabinoid field. We are now in the position to explore the specific signalling interactions by which maternal cannabis abuse affects the fetal brain.

What are the potential clinical implications of your work?

» I think our recent discovery showing that β-amyloid, a protein that accumulates in senile plaques in Alzheimer's disease, may induce epilepsy (Minkeviciene et al, 2009) provides a new understanding of why many Alzheimer's patients develop epilepsy during disease progression. I hope this will lead to more effective therapies. And, of course, I hope that our findings on maternal drug abuse during pregnancy will reveal new molecular targets that will allow us to help affected children.

Your lab uses a broad range of approaches; which new technologies are you most excited about?

» I am really excited about the much-awaited SULSA core facility for high-resolution, dynamic live-cell and molecular imaging, which we hope to launch in October this year! We are also developing some new high-throughput screens to nail the effects of drugs on the global proteome and transcriptome.

What attracted you to Scotland and to Aberdeen specifically?

» Initially, I was attracted to Aberdeen because of the long tradition of cannabinoid research here. I hoped that interacting directly with cannabinoid pharmacologists would be extremely beneficial. But I was also impressed by the cell biology know-how gathered in Aberdeen. Most of all, however, the clear scientific vision of the management of the College of Life Sciences and Medicine and of the School of Medical Sciences convinced me that Aberdeen is a place where ambitious people are gathering, and that this is a centre aiming to achieve a quantum leap in scientific understanding. I admire the amount of careful investment being made in recent years to strengthen Aberdeen's stature. The close proximity of other Scottish Universities is also a real benefit and we have started fruitful collaborations in St. Andrews, Edinburgh and Glasgow.

Finally, you were recently recognised as an EMBO Young Investigator. What advice would you give to young researchers who want to pursue a career in Europe?

» That although competition is tougher than ever, they can be successful if they do not lose their objectives, commitment, and creativity!

email: **t.harkany@abdn.ac.uk**

FURTHER READING

» Berghuis et al. – **Endocannabinoids regulate interneuron migration and morphogenesis by transactivating the TrkB receptor** PNAS 2005 102, 19115-20

» Berghuis P. et al. – **Hardwiring the Brain: Endocannabinoids Shape Neuronal Connectivity** SCIENCE. 2007, 316:1212-6

» Harkany T. et al. – **Wiring and Firing Neuronal Networks: Endocannabinoids Take Center Stage** CURR OPIN NEUROBIOL. 2008, 18:338-45

» Minkeviciene R. et al. – **Amyloid Beta-Induced Neuronal Hyperexcitability Triggers Progressive Epilepsy** J NEUROSCI. 2009, 29:3453-62

» Mulder J. et al. – **Endocannabinoid Signaling Controls Pyramidal Cell Specification and Long-Range Axon Patterning** PNAS. 2008, 105:8760-5