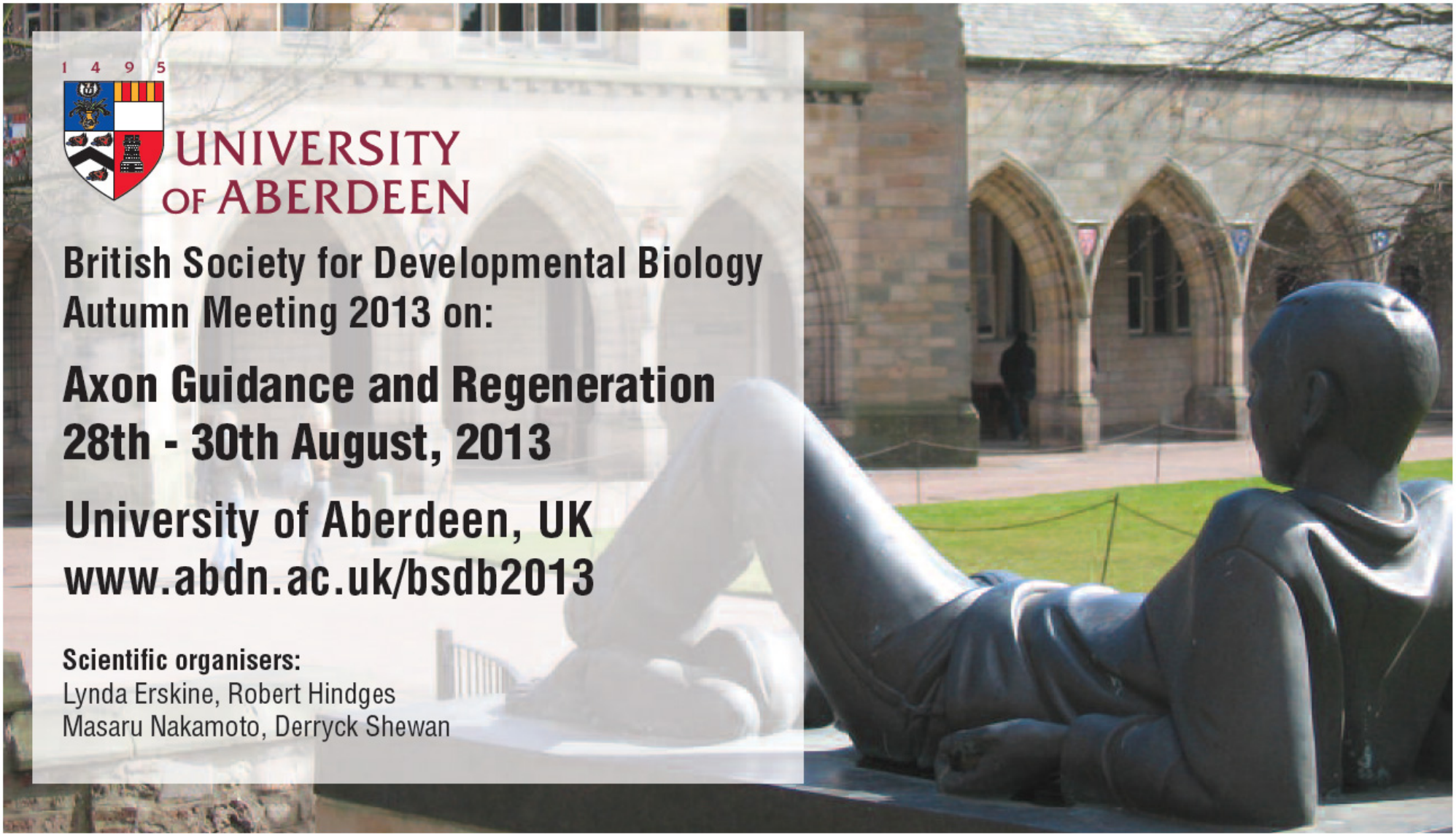

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UNIVERSITY OF ABERDEEN

British Society for Developmental Biology Autumn Meeting 2013 on:

Axon Guidance and Regeneration

28th - 30th August, 2013

University of Aberdeen, UK

www.abdn.ac.uk/bsdb2013

Scientific organisers:
Lynda Erskine, Robert Hindges
Masaru Nakamoto, Derryck Shewan

BSDB

British Society for Developmental Biology (BSDB) conference 2013

Axon guidance and Regeneration

28th – 30th August, 2013

University of Aberdeen, Scotland, UK

PROGRAMME

Wednesday 28th August 2013

12.00 – 14.30 Registration opens — Elphinstone Hall

14.15 – 14.20 Welcome Address by Professor Ian Diamond, Principal and Vice-Chancellor, UoA — NK1/6

14.20 – 15.20 **Session 1, Plenary Talk** - Wiring the embryonic eye to brain for binocular vision — NK1/6

Professor Carol Mason (Columbia University) — NK1/6

Wiring the embryonic eye to brain for binocular vision

15.20 – 16.00 *Refreshment break, posters and exhibitions* — Elphinstone Hall

16.00 – 17.30 **Session 2, Cytoskeleton/signalling** — NK1/6

16.00 – 16.30	S1	Professor Philip Gordon Weeks Kings College London, UK	Microtubule-Actin Filament Interactions In Neuritogenesis and Growth Cone Pathfinding
16.30 – 16.45	O1	Andreas Prokop Faculty of Life Sciences, The University of Manchester, Manchester, UK	How to make or break an axon - understanding the essential roles of actin and microtubules
16.45 – 17.00	O2	Karel Dorey University of Manchester, Manchester, UK	Regulation of axonal branching during development and regeneration
17.00 – 17.30	S2	Paola Bovolenta Universidad Autónoma de Madrid	Shh signaling in the establishment of mouse visual projections

17.30 – 19.00 *Free Time*

19.00 – 21.30 Poster session, drinks and buffet meal — Elphinstone Hall

Thursday 29th August 2013

08.30 – 09.00 Registrations open — Elphinstone Hall

09.00 – 10.30 **Session 3, Guidance mechanisms I** — NK1/6

09.00 – 09.30	S3	Alain Chédotal Institut de la Vision, Paris, France	Development, evolution and function of brain commissures
09.30 – 10.00	O3	Tyler Sloan Institut de Recherches Cliniques de Montréal (IRCM), Montreal, Canada	Sonic Hedgehog and Netrin Collaborate to Enhance Growth Cone Sensitivity when Gradients are Shallow
10.00 – 10.15	O4	Paride Antinucci MRC Centre for Developmental Neurobiology, King's College London, Guy's Campus, London, UK	Teneurin-3 specifies morphological and functional connectivity of retinal ganglion cells in the vertebrate visual system
10.15 – 10.30	S4	Iris Salecker NIMR, London, UK	Regulation of glial cell morphogenesis during visual circuit assembly of Drosophila

10.30 – 11.00 *Refreshment break, posters and exhibitions* — Elphinstone Hall

11.00 – 12.30 **Session 4, Paper Guidance mechanisms II** — NK1/6

11.00 – 11.30	S5	Eloisa Herrera Instituto de Neurosciencias, Alicante, Spain	Transcriptional control of axon midline avoidance

11.30 – 12.00	O5	Nickolai Vysokov Imperial College London, London, UK	Lasso/teneurin-2 is cleaved in vitro and in vivo and the soluble fragment stimulates axonal growth
12.00 – 12.15	O6	Francesca Mackenzie UCL Institute of Ophthalmology, London, UK	Boundary cap and axon organisation at the developing CNS/PNS interface through the class 3 semaphorins via their neuropilin receptors
12.15 – 12.30	S6	Artur Kania Institut de Recherches Cliniques de Montreal, Canada	Ephrin-netrin synergy in motor axon guidance

12.30 – 14.00 *Lunch* Elphinstone Hall

14.00 – 15.30 **Session 5, Paper Presentations** NK1/6

14.00 – 14.30	S7	Geoffrey Goodhill University of Queensland, Australia	The dynamics of growth cone morphology
14.30 – 15.00	O7	Kristian Franze University of Cambridge, Cambridge, UK	Neuronal mechanosensitivity in axon guidance
15.00 – 15.15	O8	Philipp Suetterlin King's College London, London, UK	Dissecting the role of retinal vs. collicular expression of ephrinA5 in topographic mapping
15.15 – 15.30	S8	Franco Weth Karlsruhe Institute of Technology, Germany	Adaptation in Topographic Axon Guidance

15.30 – 16.00 *Refreshment break and posters* Elphinstone Hall

16.00 – 17.30 **Session 6, Plenary Talk** - Axons guidance in the developing visual system: an RNA-based view NK1/6
Professor Christine Holt, University of Cambridge

19.00 – 19.30 Pre-dinner drinks/Civic Reception

19.30 Dinner & Ceilidh Star Ballroom, Beech Ballroom

Friday 30th August 2013

09.00 – 10.30 **Session 7, Paper Presentations** NK1/6

09.00 – 09.30	S9	Geoff Cook University of Cambridge, UK	Growth cone repulsion in spinal axon guidance
09.30 – 10.00	O9	Wolfgang Pita-Thomas University of Miami, Miami, Florida, USA	Promoting axon regeneration in retinal ganglion cells by magnetically applying mechanical tension to membrane-bound superparamagnetic iron oxide nanoparticles
10.00 – 10.15	O10	Vance Lemmon University of Miami, Miami, FL, USA	Using kinase inhibitors to identify protein kinases that regulate neurite growth
10.15 – 10.30	S10	Charles ffrench-Constant University of Edinburgh, UK	Manipulation of tissue and inflammation biology to enhance CNS regeneration

10.30 – 11.00 *Refreshment break, posters and exhibitions* Elphinstone Hall

11.00 – 12.30 **Session 8, Paper Presentations** NK1/6

11.00 – 11.30	S11	Frank Bradke DZNE, Bonn, Germany	Cytoskeletal Mechanisms of Axonal Growth and Regeneration
11.30 – 12.00	O11	Robert Hindges Kings College London, London, UK	Plastic rearrangement of visual connectivity after partial perinatal retinal degeneration
12.00 – 12.15	O12	Laura Conforti School of Biomedical Sciences, University of Nottingham, Nottingham, UK	NAD precursor Nicotinamide Mononucleotide (NMN) initiates axon degeneration
12.15 – 12.30	S12	Catherina Becker University of Edinburgh, UK	Control of motor neuron generation and regeneration in zebrafish

12.30 Conference ends

BSDB Axon Guidance and Regeneration

28th - 30th August, 2013
University of Aberdeen, UK

The Autumn Meeting of the BSDB on 'Axon Guidance and Regeneration', held on the 28th - 30th August, 2013 at the University of Aberdeen in the beautiful surroundings of Old Aberdeen, was an excellent conference of around sixty delegates, full of exciting talks, highly distinguished speakers, and many opportunities for interaction and fruitful discussion. Talks and posters throughout the conference ranged over a number of fascinating topics, including both classical and novel axon guidance mechanisms (how neurons project axons correctly to specific targets to achieve the circuitry of the nervous system) and how these findings may be used to promote axon regeneration after injury or disease. How different axons project to specific targets in the same environment was discussed in detail, including novel and exciting evidence to support the idea of how not only one specific axon guidance cue, but combined cues acting in synergy, combined with a variety of receptors on different cells, as well as translation and transcription, can guide axons. We were extremely lucky to have two wonderful and inspiring plenary talks. Using the optic system as a model, Professor Carole Mason (Columia University, USA) showed her work on how a combination of the guidance molecules Sema6d, PlexinA1 and NRCAM are all required at the optic chiasm for contralateral retinal ganglion cell axons to cross the midline, an important mechanism for the correct connectivity of the visual system. These findings bring forward the idea that a consortia of guidance molecules and specification cues both on the axon growth cone and in the environment is needed for correct axon guidance. In addition, Professor Mason showed exciting new work on how the birthdate (neurogenesis rate) of different neurons in the eye may lead to specification of their identity. In the second plenary lecture, Professor Christine Holt (University of Cambridge, UK) showed us her fascinating work on how differential translation of the actin assembly machinery in different parts of the axon growth cone can lead to attraction or repulsion. This suggests that local translation in the axon, dendritic spine and surrounding cells can affect axon guidance and neuronal activity. In addition, Paola Bovolenta (Instituto de Neurociencias, Spain) described her work on how different levels of the morphogen sonic hedgehog (Shh) in both RGC cells themselves and at the midline are important for correct guidance of RGC axons. Artur Kania (Institut de Recherches Cliniques De Montreal, Canada) and Franco Weth (Karlsruhe Institute of Technology, Germany) added to this theme and described complex and novel work showing how guidance cue additivity, synergy and a variety of forward/reverse and cis/trans signalling through multireceptor complexes on growth cones can guide axons. How to study what happens to the circuitry of the nervous system when correct axon guidance is disturbed or incomplete was discussed by several speakers, in particular by using transgenic mouse, fish and fly models to disturb genes in particular parts of the optic system. The function of non-neuronal cells in axon guidance and regeneration was also discussed. Iris Salecker (NIMR, UK) described how their beautiful imaging of CNS glia in Drosophila medulla neuropil glia (mng) mutants is helping to define the development of different glial classes and the nature of their association with developing axons, and to suggest novel genes involved in these processes. Charles ffrench-Constant (MRC Centre for Regenerative Medicine, UK) told us about his group's work on oligodendrocytes and central remyelination, and in particular, how a limited window for CNS remyelination in the CNS by oligodendrocytes may be extremely important for targeting therapies in multiple sclerosis. Several talks focused on the genes and mechanisms controlling the physical process of axon extension and how these may be manipulated to promote axon regeneration. Kristjan Franze (University of Cambridge, UK) used high-resolution 'stiffness' maps of Xenopus brain tissue to show that axonal growth speed and length is affected by the 'stiffness' of the axonal growth substrate. This exciting finding suggests that, in addition to typical chemical signals, mechanical forces in surrounding tissue are important for correct axon guidance, and suggest that a

mechanosensative channel may be important. In a similar technological advance, Geoffrey Goodhill (University of Queensland, Australia) showed how their careful and in-depth timelapse analysis of axon growth cone morphology led to the discovery of oscillations in growth cone shape over time, and that these oscillations predict the eventual movement and guidance of the growth cone. Finally, exciting findings in enhancing CNS axon regrowth were shown by Frank Bradke (DZNE, Germany). By using a blood-brain barrier crossing drug to stabilise axonal microtubules, causing an accumulation of microtubules at the axon leading edge and axon regrowth, they were able to show functional recovery after CNS injury in rodents, an inspiring result in the difficult CNS environment.

The conference location in the historic Elphinstone Hall and New Lecture Theatre at the University of Aberdeen, surrounded by greenery and beautiful buildings, provided a tranquil environment for many enjoyable and productive discussions and informal chats over refreshments and during excellent poster sessions. On the last night, we were treated to the sight of dolphins swimming in the sea next to Aberdeen beach, during a drinks reception before a great Conference Dinner and opportunity to relax and socialise in the Beach Ballroom on Aberdeen seafront. This was followed later in the evening by a very active and enjoyable Ceilidh (traditional Scottish dance), ably assisted by our Scottish delegates.

I would like to thank the conference organisers and BSDB for providing this great opportunity for researchers to hear about and discuss cutting-edge and exciting research in the field of axon guidance and regeneration.

Francesca Mackenzie
Research Associate, UCL Institute of Ophthalmology

ISDB 17th Congress in Cancun Mexico

16-20 June, 2013
Cancun Mexico

The 17th international congress of developmental biology was held in June this year in Cancun, Mexico. The meeting, with over 600 participants and three parallel sessions every day, covered a wide range of areas in developmental biology from molecular, cellular and organismal perspectives.

The meeting started with a session on 'growth and form' where an insightful talk by Alejandro Sanchez Alvarado discussed how developmental transcriptome could be used to overcome the inadequacy of traditional terminology in describing the stages in flatworm embryonic development. This was followed by Celeste Nelson's talk on the role of biomechanical cues in morphogenesis and branching of epithelial tubes. This talk discussed a method to reliably quantify mechanical stress during the morphogenesis of cultured epithelial tubes. Talk by Elly Tanaka highlighted two different ways of limb regeneration in axolotls and newts. Elliot Meyerowitz delivered this years EMBO lecture on how mechanical forces can control chemical signalling during pattern formation in Arabidopsis meristem.

There were several excellent plenary talks throughout the meeting. John Gurdon rose to deliver the first of these amidst a standing ovation from the audience to honour his seminal contributions to the field and his recent Nobel Prize. Prof. Gurdon focused on the process of gene re-activation and the mechanisms of resistance to reprogramming in somatic nuclei transplanted into the Xenopus germinal vesicles. His results showed that understanding both these aspects of reprogramming are essential for developing an effective cell replacement therapy. Plenary talks by Peter Holland and Patricia Beldale addressed the genetic basis of phenotypic diversity in animals. While Peter Holland concentrated on genotypic diversity and Hox cluster expansion in butterflies and moths,

Beldale approached this question by studying the genetic basis of pattern formation in butterfly wing spots.

Cliff Tabin's talk on the evolution of morphological traits in cavefish and in humans was of particular interest. By comparing human and chimp genomes, his lab has identified over 200 human specific enhancer deletions that could underlie regressive human traits (like reduction in body hair).

Janet Rossant delivered this year's ISDB Harrison medal lecture. The ISDB president Claudio Stern presented Prof. Rossant and many of the past recipients with a newly designed Harrision prize medal. In her highly entertaining talk (with a cheesy 1980s video on 'transgenic techniques in mice'), Prof. Rossant gave an overview of her research stretching back to her PhD days in Cambridge. She discussed the ideas and experiment that led to an understanding of cell fate decisions in mouse embryos and the mechanisms that regulate pluripotency and differentiation in ES cells. She had an important advice for young researchers, "start with an interesting problem so that you can keep coming back to it."

Neural crest research was in the limelight this year, with the EG Conklin medal of the SDB to Marianne Bronner, the first ever LASDB prize for Roberto Mayor and the SDB poster prize to Kara Nordin (a PhD student from Carole LaBonne's lab at the Northwestern university). Kara studies the function of SoxE factors and Sox5 in neural crest development. Her results have clarified the role of these transcription factors in melanocyte vs chondrocyte fate decision. She will be presenting her work at the next BSDB meeting in Warwick. John Fallon was presented with the SDB lifetime achievement award. In his talk, 'The limb and I', Prof. Fallon discussed experiments that led to an understanding of molecular and cellular mechanisms that drive vertebrate limb development.

Claudio stern organised a very useful round table discussion on 'suceeding in research in a competitive environment'. A panel of eminent scientists (Marianne Bronner, Eddy de Robertis, Maria Leptin, Janet Rossant and Masatoshi Takeichi) engaged in a frank discussion with the audience on the do's and don'ts in research. All of them emphasised the importance of focus, lateral thinking and having a work-life balance.

Finally, Phil Ingam was elected as the new president of the ISDB at the meeting and Singapore was chosen as the venue for the next ISDB congress in 2017.

Aditya Saxena
PhD student with Helen Skaer
Department of Zoology
University of Cambridge