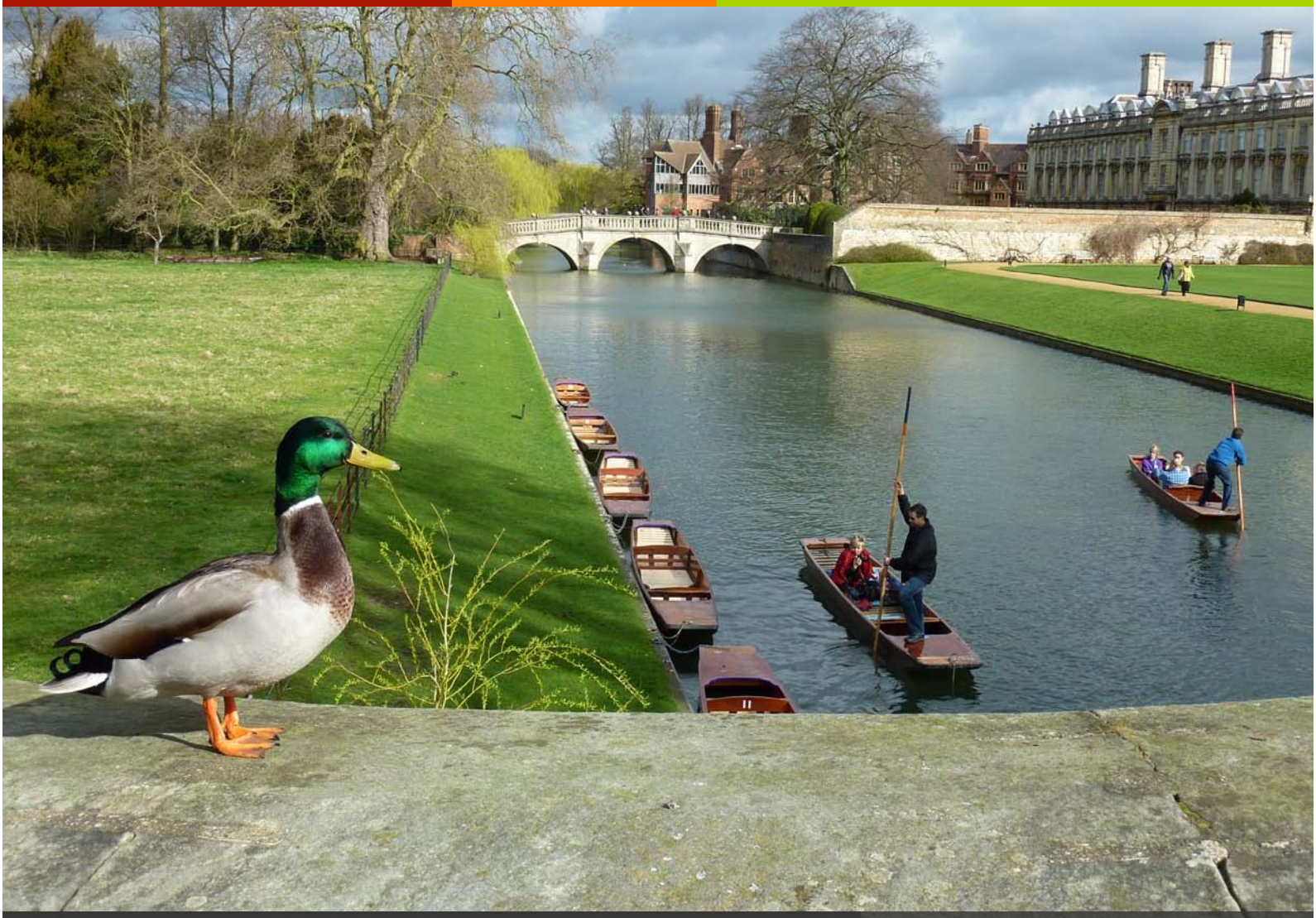
Cambridge Science Summer School



2013

Programme Director: Dr. Joyce Wong

The Cambridge Science Summer School offers a unique opportunity to experience a free academic environment which enables you to exercise the right of a scholar to unhampered passage in the interest of education. The University of Cambridge possesses a secular education system, not restricted by religion, whose teachings encompass not only science, but also philosophy, law, music, arts and humanities. We are very proud to be currently ranked one of the top universities in the QS World University Rankings of over 600 global universities. Our summer programme will bring you into this intellectual community with highly motivated students representing many different nationalities, cultural backgrounds and industries to learn in a collaborative environment. Our aim is to stimulate academically brilliant students from all over the world to participate directly in scientific research, working closely with senior faculty members and engaging in scientific discussion. Our progamme is designed to help students develop the right mindset for research and learn how, through successful communication and collaboration, to turn hypotheses into practical success. We invite you to participate in cutting edge science by working alongside our best principal investigators from research-intensive departments at one of the oldest and finest universities in the world.

Applications are welcomed from students coming from overseas universities who can demonstrate proficiency in English. Competition for places is intense, so early application is advised.

"Formula for breakthroughs in research: Take young researchers, put them together, give them an unprecedented degree of freedom and turn up the pressure by fostering competitiveness."

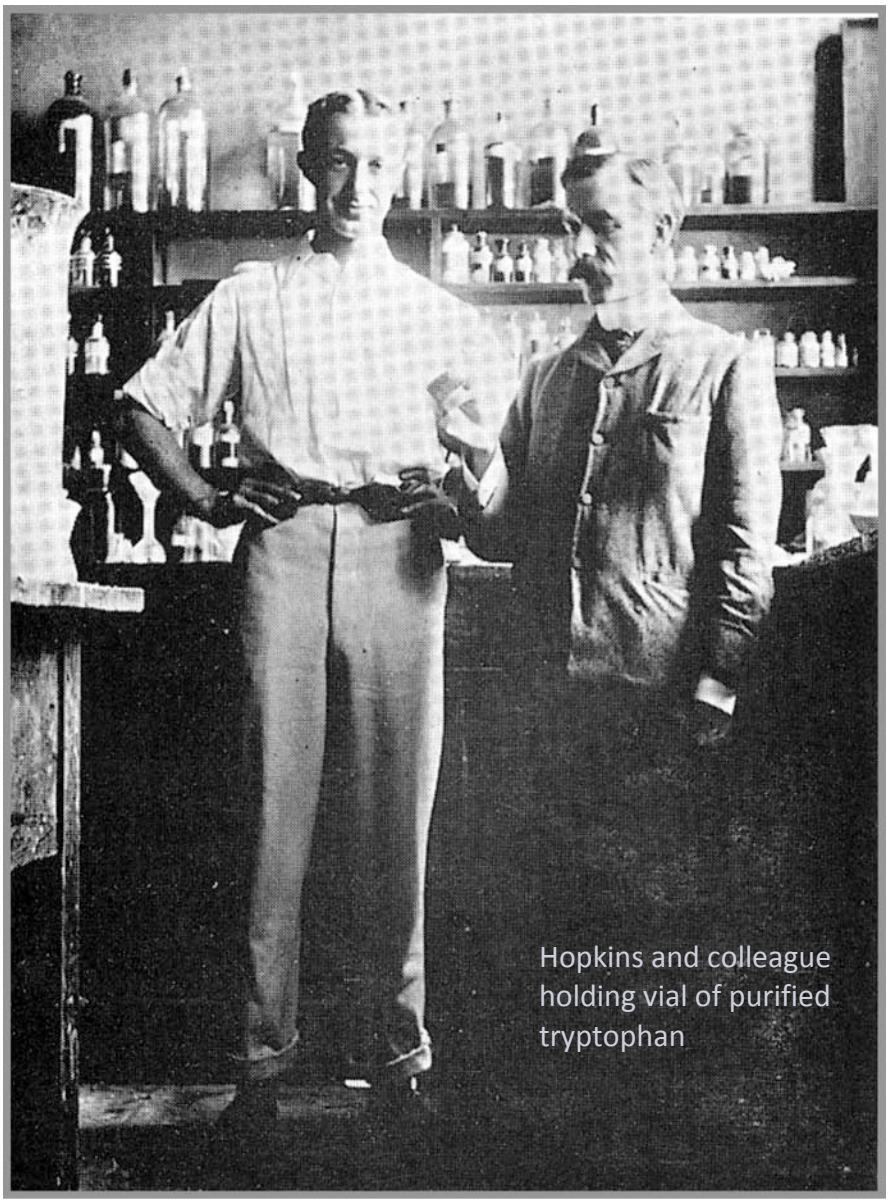
James Watson

"My goal is simple. It is complete understanding of the universe, why it is as it is and why it exists at all."

Stephen Hawking

The origins of Cambridge can be traced back 3500 years to a farmstead located at the site of the present day Fitzwilliam Museum. When the Romans invaded Britain, they made use of the pre-existing settlement of the Belgic peoples, on what is now the Castle Mound, as their own fortress. They named this fortress Duroliponte, and it was perfect for defending the important River Cam against incursions from the Celtic natives to the North and West. After some 350 years, Duroliponte fell to the invading Saxons, a Germanic people that named the settlement Grantabrycge (literally: Bridge over the river Granta) and it became an important trade route North to the peoples of the marshland Fens. With the arrival of the Vikings, Grantabrycge quickly grew into a thriving market town, relocating from the Castle Mound on the river's left bank to the Quayside on the right. When the Vikings left, the Saxons took the town back, building St Bene't church in 1025, where it still stands on Bene't Street. In 1068, the invading Normans re-fortified the castle mound and began building anew. By this time, the town's name had evolved from Grantabrycge to Grentabrige or Cantebrigge (Grantbridge), reflecting the importance of its bridge over the river Granta. Cantebrigge eventually evolved to "Cambridge" and Granta to "Cam" (although the upper river is still affectionately referred to as "The Granta)." In 1209, students fleeing the unrest in Oxford settled in the then quiet and safe backwater of Cambridge, founding the University's first college – Peterhouse. From that day on, the University has grown progressively into a World Class academic institution that can lay claim to 89 Nobel Laureats - more than any other institution in the world. The present day Cambridge skyline is awash with the spires and towers that grace its many colleges, churches and research laboratories while down below is a world of quiet green quadrangles, bustling markets, modern shopping malls and, snaking through it all, the calm and beautiful river Cam.

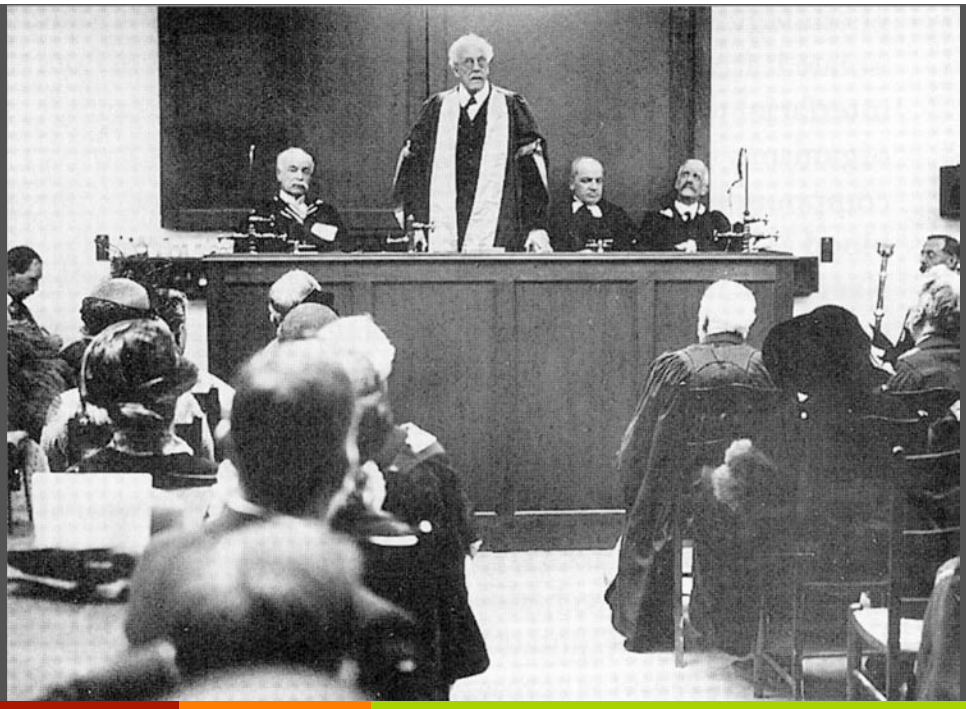
History of the participating Departments and Research Institutes



Hopkins and colleague holding vial of purified tryptophan

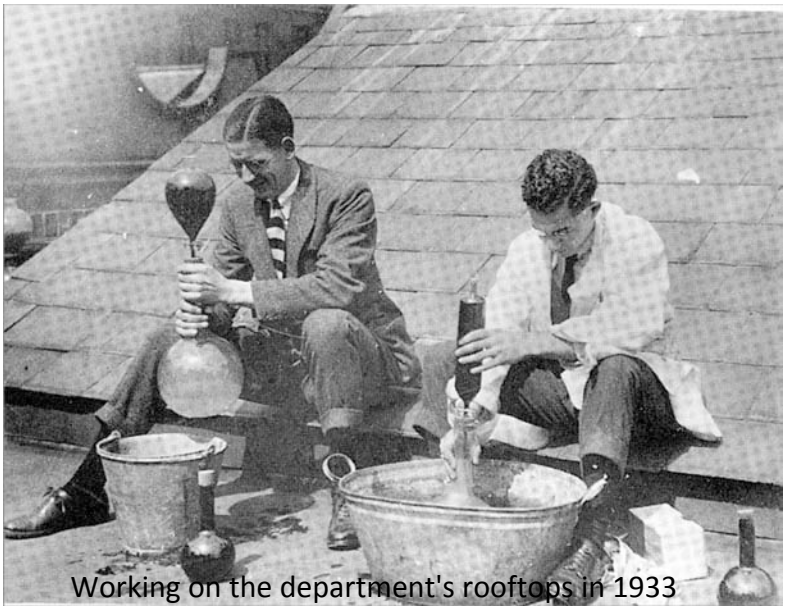
The Cambridge University Department of Biochemistry has its foundations in the Sir William Dunn Institute of Biochemistry, a research institute endowed from the estate of Sir William Dunn, opened in 1924 and created for Frederick Gowland Hopkins (FRS, OM, Nobel Laureate) on the recommendation of Walter Morley Fletcher, first Head of the Medical Research Council. The institute underpinned the evolution of Hopkins's school of biochemistry, which dominated the emerging discipline of biochemistry through the 1920s and 1930s and trained many subsequent leaders in the field, including Nobel Laureates like Hans Krebs, Ernst Chain, Fred Sanger, Rodney Porter, Peter Mitchell and Tim Hunt. One of the Department of Biochemistry's most illustrious alumni was Joseph Needham, CH, FRS, FBA, also known as Li Yuese (李约瑟), who was not only a great biochemist but also an historian and the foremost British authority on China. Needham was the director of the Sino-British Science Co-operation Office in Chongqing from 1942 to 1946, making several long journeys through war-torn China, visiting scientific and educational establishments and obtaining for them much needed materials and supplies. He was acquainted with Zhou Enlai and numerous Chinese scholars, including the painter Wu Zuoren (吳作人) and the meteorologist Zhu Kezhen. Needham did more than any other Westerner to raise awareness in the West of the tremendous technological and scientific creativity of the Chinese culture.

Today, the department builds on those past giants and is a vibrant, world-class scientific community with an extremely wide range of scientific interests that includes plant biology (food security and biofuels), parasitology, bacterial genetics and pathogenesis, structural biology, cell and tissue biology, regulation of chromatin, DNA damage and control of gene expression, cancer and cardiovascular disease. The Department of Biochemistry is one of the largest departments in Cambridge - with around 400 research and support



Lord Balfour opening the Department of Biochemistry in 1924

staff and houses an internationally competitive research programme and state-of-the-art equipment and resources, including an 800MHz NMR facility, modern X-ray laboratories, core facilities for mass spectrometry and plasmon resonance, advanced services for protein and nucleic acid sequencing, and sophisticated mouse genetics. In collaboration with the Department of Genetics was established a new Systems Biology Centre that encompasses array technologies, proteomics and informatics, as well as metabolomics. These new developments underpin research in a range of different biological processes from molecular enzymology, through cell signalling and control of gene expression, to molecular microbiology, plant molecular biology and biofuel research, cancer and cardiovascular biology.



Working on the department's rooftops in 1933

The Cambridge University Department of Pharmacology is another of the nine departments that together comprise the School of Biological Sciences and the largest department of Pharmacology in the United Kingdom. The Department is under the directorship of Professor Peter McNaughton, a world expert on the molecular biology of pain. The over-arching theme of research in the Department is to uncover the fundamental mechanisms that underlie important problems in Pharmacology. Major research areas of the Department include cellular neuroscience, systems neuroscience, cell signalling, ion and drug transport mechanisms, biomolecular imaging of molecular complexes and machines using atomic force microscopy and vascular biology. The Department is responsible for teaching students preparing for the medical and veterinary professions as well as students of natural science.

In 2003, the Department of Pathology, just down the road, celebrated its 120th birthday. It began in 1883 when a group of influential medical men in Cambridge identified a need for academic leadership in the growing field of Pathology. Its second professor, Alfredo Kanthack, is credited with the invention of formalin as a histological fixative and in the 1940s it was Ronald Greaves who developed reliable methods for freeze drying plasma, which saved countless lives during the Second World War. In the 1970s, under its much loved professor, Peter Wilde, the department diversified into its present sub-specialties – immunology, virology, bacteriology, parasitology and cellular pathology – and earned an enviable reputation in both research and in medical and scientific teaching. Its current head is Prof. Geoff Smith FRS, FMedSci, FIBiol was appointed in 2010 and is a renowned expert in poxviruses.

The origins of physiology as a discrete discipline in Cambridge go back to 1883, when Michael Foster became the first Professor of Physiology. In the early 1900s, John Newport Langley pioneered studies on the physiology of the autonomic nervous system and, as Professor, presided over the Laboratory's move in 1914 to the handsome building provided by the generosity of the Drapers Company. The Department was also where Lord Adrian of Cambridge, O.M., FRS and Nobel Laureate did his groundbreaking work on electrophysiology of neuromuscular junctions. Anatomy, the bedrock of medicine, has been taught at Cambridge since its foundation in about 1231, although the first appointment to a professorship in anatomy, Sir George Humphry FRS, was not until the 19th century. Prof Dixon Boyd was renowned for his meticulous research on human fetal and placental development in the

1960s, while Hans Kuypers FRS was instrumental in developing the Department's strengths in neuroanatomy and functional neuroscience. In 2006, the Departments of Physiology and Anatomy were merged into the new Department of Physiology, Development and Neuroscience (PDN) and Professor Bill Harris Ph.D., FRS, FMedSci, became its head. Research in PDN is focused on four principal research areas – Cellular and Systems Biology, Developmental and Reproductive Biology, Neuroscience and Form and Function (how tissues and organs are shaped during development and how such resultant architecture contributes to their specialised functions). In addition, PDN remains the home of preclinical teaching in Anatomy and Physiology for some 800 medical, veterinary and natural science undergraduates each year, while its 31 research laboratories accommodate some 70 graduate students. PDN also houses the School's multi-imaging centre, the centre for

trophoblast research and the centre for the neural basis of hearing.

Leading biological science research institutes:

The Cambridge Stem Cell Institute is a collaboration between the Wellcome Trust and the Medical Research Council with the aim of advancing our understanding of stem cells and their potential to treat a range of life-threatening conditions that currently have no effective cures. Leading research scientists, technology specialists and doctors work side by side to create a world-leading centre of excellence in stem cell biology and medicine. The Institute also provides high-level training for young researchers from around the world and collaborates with bio-industry. The institute comprises some 20 laboratories and is directed by Professor Austin Smith, Ph.D., FRS. A major focus in the institute is deciphering the mechanism underlying pluripotency and hematopiesis, which represents the best studied adult mammalian stem cell system and offers paradigms for the mechanisms whereby normal stem cells are subverted into cancer cells.

The Gurdon Institute is a collaboration between the Wellcome Trust and Cancer Research UK, the UK's principal cancer research charity. It was founded in 1989 to promote research in the overlapping areas of developmental biology and cancer biology, and is an ensemble of some 20 independent research groups located in one building designed to promote as much interaction as possible. The institute is directed by Professor Daniel St Johnston Ph.D., FRS and its deputy director is Professor Tony Kouzarides, Ph.D. FRS. The Gurdon Institute is named after the renowned developmental biologist Sir John Gurdon Kt, DPhil., DSc, FRS, Nobel Laureate 2012, who pioneered the concept that specialised cells are genetically equivalent and that they differ not in the genes they contain but in the genes they express, a concept fundamental to modern biology. Sir John remains as a distinguished Group Leader in the Institute. The various laboratories at the Gurdon Institute study diverse areas including chromatin regulation, organismal development and morphogenesis, cell polarity, cell cycle, DNA replication, DNA damage responses, and imprinting.

All four Departments and two leading Research Institutes participating in the CSSS Programme - Biochemistry, Pharmacology, Pathology, PDN, the Gurdon Institute and the Wellcome Trust Stem Cell Institute - are components of the highly collegiate School of Biological Sciences. We also have close links with other World Class Cambridge Institutes, including the renowned MRC Laboratory of Molecular Biology, the Cancer Research UK Institute (CRI), the Babraham Institute and the world famous Wellcome Trust Sanger Centre where the human genome sequencing project was completed.

Life in Departments, Research Institutes, Colleges and the University of Cambridge

Undergraduate and graduate teaching remain our highest priorities – imparting both scientific knowledge and the passion for science that we all share.

Cambridge was the crucible for experimental science in the 17th century and we preserve that tradition of free thought, fierce independence, creativity, free discussion and exchange of ideas and, above all, of academic community. We believe that the best science comes from supporting individuals and building a collegiate community of enquiring minds. This important social aspect of science in Cambridge is nurtured by the University's college system, which provides not only accommodation but also a sense of belonging to an intellectually diverse community on a small, village-like scale. A Summer spent in Cambridge doesn't just train you in science, it teaches you how to think about scientific problems, ask critical questions, generate testable hypotheses, plan experiments, interpret data and discover how things work. *En passant*, you will be exposed to thought leaders and towering intellects from every walk of human endeavour.

Department of Pathology: http://www.path.cam.ac.uk
Department of Pharmacology: http://www.phar.cam.ac.uk
Department of Biochemistry: http://www.bioc.cam.ac.uk
Department of PDN: http://www.pdn.cam.ac.uk
Gurdon: http://www.gurdon.cam.ac.uk/groups.html
Stem Cell: http://www.stemcells.cam.ac.uk

"What is known for certain is dull."

Max Perutz

“A Summer in Cambridge is also an investment. Science is an intensely social enterprise, forged through friendship and mutual respect. Our Summer Programme will provide unparalleled opportunities to meet, socialize and work with eminent scientists. We hope that your experiences and the relationships you establish will lead you to return to us in the future, rejoining our community as our future Masters and Ph.D. students.”

Professor Gerard Evan

“Through art and science in their broadest senses it is possible to make a permanent contribution towards the improvement and enrichment of human life and it is these pursuits that we students are engaged in.”

Fred Sanger

Who is who?

(but not a complete list of research groups)

Professor Gerard Evan, Ph.D., F.Med.Sci, FRS is the Sir William Dunn Professor of Biochemistry in the University of Cambridge and head of the Department of Biochemistry. He is one of the world's foremost experts on oncogenes – the genes that drive the development of cancer – and on tumour suppressors – the genes that prevent cancers. He is best known for his work on the enigmatic Myc oncoprotein, whose deregulation is implicated in the majority of human cancers: in particular, for his discovery that oncogenes like Myc that drive deregulated cell growth also trigger cell death – an inbuilt tumour suppressor programme that is corrupted in all cancers. His approach is unique – he used switchable genetics to turn off and on specific cancer genes in tissues *in vivo* and uses these models to identify novel targets for anti-cancer drugs. From 1999-2009, he was the Distinguished Professor of Cancer Research at the University of California, San Francisco, returning in 2009 to head the department of Biochemistry at Cambridge. Professor Evan's contribution to cancer research have been widely recognized: he is an elected member of the European Molecular Biology Organisation and a fellow of the UK Academy of Medical Sciences, the European Academy of Sciences and the Royal Society.

Professor Peter Leadlay, Ph.D., FRS, is the Herchel Smith Professor of Biochemistry in the University of Cambridge. His research concerns the natural pathways for biosynthesis of antibiotics and how they can be altered to produce tailored novel therapeutics. His current interests are in the synthetic biology, the genetics and bioengineering of natural product biosynthetic pathways, identification of novel cellular targets for natural products, and genome mining for novel biosynthetic enzymes and pathways, and synthetic biology. Peter studied Chemistry at Oxford, then at ETH Zürich and joined the Biochemistry Department in Cambridge in 1979. He is a recipient of various awards including the American Chemical Society Remsen Award (2006), a Chaire Internationale de Recherche "Blaise Pascal" held at Institut Pasteur Paris (2003-2004), and the Smets Chair at Louvain/Leuven (2009). He was elected a Fellow of the Royal Society in 2000. He is co-founder of the Cambridge-based biotech company BIOTICA.

Professor Ben Luisi, PhD., is Professor of Structural Biology in the Department of Biochemistry at the University of Cambridge, UK. He received his Ph.D. in 1985 from the University of Cambridge and did postdoctoral work on protein–DNA interactions in the group of Paul Sigler at the University of Chicago, Illinois, USA, and Yale University, New Haven, Connecticut, USA. He became an independent group leader at the Medical Research Council Virology Unit in Glasgow, UK, in 1990 and then moved to Cambridge in 1995. The work of his research group focuses on structural and biochemical studies of RNA metabolic enzymes with the general aim of understanding how fundamental cellular processes are controlled through molecular interactions in multi-component assemblies.

Dr Kathryn Lilley, MA, Ph.D. is University Reader in quantitative Proteomics at the Department of Biochemistry and director of the Cambridge Centre for Proteomics, which is part of the Cambridge Systems Biology Centre. Her research uses advanced proteomic technologies to ascertain where proteins are located within cellular structures and how their flux over time and variation in post-translational state may be monitored in a high throughput manner. To do this, she is developing quantitative proteomics techniques for use in conjunction with membrane proteins, organelle proteomics and protein trafficking, as well as novel experimental strategies and methods for statistical analysis of quantitative proteomics data.

Professor Geoffrey Smith, FRS FMedSci FIBiol is Professor and Head of the Department of Pathology, University of Cambridge and a Principal Research Fellow of the Wellcome Trust. He is a virologist whose research focus is poxviruses – notably vaccinia virus, the vaccine used to eradicate smallpox – with a particular interest in how these viruses interact with the host cell and the host immune system. He gained his Ph.D. working on influenza virus at the National Institute for Medical Research, London and then moved for a post-doctoral fellowship to the USA, working at the National Institutes of Health, where he developed vaccinia virus as an expression vector and pioneered the development of genetically engineered live vaccines. He then established his own research group at the University of Cambridge (85-89) before moving to the Sir William Dunn School of Pathology in the University of Oxford (89-2000) and then to Imperial College London in 2000. He was appointed Professor of Pathology in Cambridge in 2011. Professor Smith is a Fellow of the Royal Society, the Academy of Medical Sciences, and the Institute of Biology. He is also President of the International Union of Microbiological Societies and Chairman of the WHO Advisory Committee for Variola Virus (smallpox) Research. In 2005 he was awarded the Feldberg Foundation Prize in Medical and Biological Science and elected a Founding Member of the European Academy of Microbiology. In 2011 he was elected a member of the German National Academy of Sciences, Leopoldina.

Dr Luca Pellegrini, BSc., Ph.D. is University Lecturer in the Department of Biochemistry whose work is centred on Structure-Function Analysis of Molecular Mechanisms for DNA Repair – in particular, the enzymes and sensors that monitor, sense and repair double strand breaks in DNA. Faithful inheritance of genetic information is essential to cellular life and requires the accurate replication of the genome and the repair of any DNA lesion that might block replication or alter the encoded message. The ultimate goal of his research is to define atomic structure and mechanism of action of the macromolecular assemblies responsible for signalling and processing of DNA DSBs and, to do this, he uses the full range of structural biology and biophysical techniques.

Dr Brian Hendrich, Ph.D., is university Lecturer and a member of both the Department of Biochemistry and the Wellcome Trust/MRC Cambridge Stem Cell Institute. Brian was an undergraduate at the University of California, San Diego, then did his Ph.D. at Stanford University, California, After a spell at the University of Edinburgh, Scotland, he moved to Cambridge where his research is focused on understanding the transcriptional regulatory mechanisms that underpin the ability of a homogeneous population of pluripotent cells to give rise to the remarkable heterogeneity existing in somatic tissues. To achieve this, his laboratory makes use of a combination of biochemistry, genetics, developmental biology, bioinformatics, ES cell manipulation, *in vitro* differentiation, proteomics and gene expression analyses.

Professor Stephen Jackson, Ph.D., F.Med.Sci, FRS, is the Frederick James Quick Professor of Biology in the Department of Biochemistry, School of the Biological Sciences at Cambridge University, UK, and a Senior Group Leader in the Wellcome Trust/Cancer Research UK Gurdon Institute of Cancer and Developmental Biology in Cambridge. Through his earlier research into transcription by eukaryotic RNA polymerases II and III, Steve discovered the DNA-dependent protein kinase, which led him into the field of DNA repair and DNA-damage signalling – a field in which he has made many, important contributions. Steve has received several prizes including, Eppendorf European Young Investigator of the Year (1995), the Tenovus Medal (1997), the Biochemical Society Colworth Medal (1997), and the Anthony Dipple Carcinogenesis Young Investigator Award (2002). He is an elected member of the European Molecular Biology Organization (EMBO), and a fellow of both the Academy of Medical Sciences and the Royal Society.

Professor Peter McNaughton, Ph.D. is Sheild Professor of Pharmacology and Head of the Cambridge Department of Pharmacology. His research is focused on the neurobiology of pain sensing. Pain is unique amongst sensations in that it increases with prolonged exposure, a process known as sensitization. His laboratory uses a range of electrophysiological and molecular biological approaches to understand the molecular and cellular basis of pain sensation. He was born in New Zealand, where he studied Physics at the University of Auckland, then took a Rhodes scholarship to study in Oxford and decided to change to the field of cardiac electrophysiology for his PhD, which he completed, in 1974. Since then, he has pursued research imainly on the cellular basis of the detection of sensations. He was a lecturer in Physiology at the University of Cambridge from 1978 to 1991, moving to London in 1991 to take up a post as Head of the Department of Physiology at King's College London. In 1999 he returned to Cambridge. He is also Wolf Professor of Pharmacology at Christ's College.

Dr Lora Heisler, Ph.D. is University Lecturer in Pharmacology and a Wellcome Trust Senior Fellow, whose work is focused on the mechanisms underlying the pathophysiology of obesity and type 2 diabetes. Her laboratory investigates the basic neurophysiology of appetite, body weight, and insulin action by examining the neurocircuitry of neurotransmitter and neuropeptide systems, and further, how these systems interact within the brain and periphery. Using complementary genetic, pharmacological, and neuroanatomical approaches, they investigate how perturbation or stimulation of components of these pathways affects energy homeostasis in an effort to identify new treatments for obesity and type 2 diabetes. The ultimate goal of her research is to elucidate the neuroendocrinology of energy homeostasis and neural influences on peripheral metabolism, in order to define novel therapeutic targets for obesity and type 2 diabetes.

Dr Randall Johnson, Ph.D., received his B.S. in Molecular Biology and B.A. in Swedish Language and Literature from the University of Washington. He studied for his Ph.D. at Harvard University and was a Jane Coffin Childs postdoctoral fellow with Doug Hanahan at the University of California San Francisco. He then moved to take up a faculty position as a professor at the University of California San Diego before moving to Cambridge in 2011, where he is now a Wellcome Trust Principal Fellow and Professor of Molecular Physiology and Pathology. Randy studies the micro-physiology of tissues, and how it affects growth, development, and disease in mammalian genetic systems. His laboratory uses genetic models to study the effects of hypoxia in physiological and pathological contexts, specifically dissecting the roles of different isoforms of Hypoxia Inducible Factors (HIF) as regulators of the hypoxia response in different cell types.

Dr Florian Hollfelder, M.Phil., Ph.D. is University Reader in Chemical Biology at the Department of `biochemistry in Cambridge and Director of Studies in Natural Sciences at Trinity Hall. His group's research is focused on quantitative and mechanistic questions at the chemistry/biology interface, involving low- and high-throughput approaches. His interests range from synthetic biology through to the design of microfluidic "lab-on-a-chip technologies. Florian was educated at the Technical University of Berlin and Cambridge University. His postdoctoral work at Harvard Medical School focused on the biosynthesis and action of the natural antibiotic microcin B17. After a formative stay at Stanford University in California working on free-energy relationships in enzymes he joined the Chemistry Department of Cambridge University to work on enzyme models and physical-organic chemistry. Florian is coordinator of several EU-funded trans-national collaborative initiatives, including the EU New and Emerging Science and Technology project (MiFem) on biological experiments in microdroplet reactors, and several Marie-Curie networks working on the directed evolution of functional proteins and protein-protein interactions.

Professor Christine Holt, Ph.D. FMedSci, FRS is Professor of Developmental Neuroscience, University of Cambridge, since 2003 and a Fellow of Gonville and Caius College. Christine graduated in Biological Sciences from the University of Sussex and worked for her Ph.D. in Zoology at the MRC, Kings College, London. After postdoctoral stays in the United States and Germany, she continued her research in the Cambridge University, where in 2003 she was made Professor in Developmetal Neuroscience. She is a member of numerous scientific societies including: EMBO (European Molecular Biology Organization), the Royal Society (FRS) and the Medical Sciences Academy (FMedSci). Her laboratory studies how nerve connections are first established in the brain with the goal of understanding the molecular and cellular mechanisms of axon guidance that enable axons to navigate from the eye to their distant synaptic targets in the midbrain.

Professor Bill Harris, Ph.D., FMedSci, FRS, is Professor of Anatomy, head of the Department of Physiology, Development and Neuroscience (PDN) and a fellow of Clare College. Canadian born, Bill was an undergraduate at the University of California Berkeley, did his Ph.D. at Caltech and a post doctoral fellowship at Harvard before moving to the University of California, San Diego. After a brief sojourn as Fogarty Fellow in Cambridge, UK, he moved here permanently in 1995 as Professor of Anatomy, later steering the highly successful merger of the Physiology and Anatomy Departments to form PDN. His pioneering work uses retinal development as his research landscape to address fundamental questions in developmental biology: Where does the nervous system come from in the embryo? How does it grow to the right size and shape? How do stem cells turn into more committed neuronal progenitors. How do those cells then know when to leave the cycle and differentiate into neural and glial progenitors?

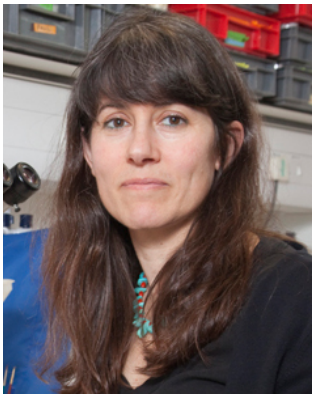
Dr Brian Ferguson, Ph.D., is University Lecturer in the Department of Pathology. He obtained his PhD from University College London working on the protein interactions that govern cell death signalling. Following a post-doctoral position in Cambridge with Professor Andrew Wyllie, one of the founding fathers of apoptosis research, Brian moved his focus to the molecular basis of infection. He obtained a Junior Research Fellowship at Imperial College to study the mechanisms by which viral proteins target the innate immune system in order to help the virus evade detection by its host. Continuing this line of research in Cambridge, the work in Brian's laboratory now utilises a broad range of state of the art techniques from protein structure to in vivo analysis to study innate immune responses (for example to foreign nucleic acids), how viruses interact with these responses and how this information can lead to the development of improved vaccines.

Professor Austin Smith, Ph.D., FRS, FRSE, FMedSci is a professor in the Department of Biochemistry and director of the Wellcome Trust Centre for Stem Cell Research at the University of Cambridge. He obtained his Ph.D. from the University of Edinburgh, then carried out postdoctoral research at the University of Oxford. He then joined the Centre for Genome Research at the University of Edinburgh as a group leader and in 1996, was appointed director of the Centre, which eventually became the Institute for Stem Cell Research under his leadership. He is notable for his pioneering work on the biology of embryonic stem cells with the goal understanding the molecular foundations of self-renewal and commitment and in 2010, was co-recipient of the Louis-Jeantet Prize for Medicine.

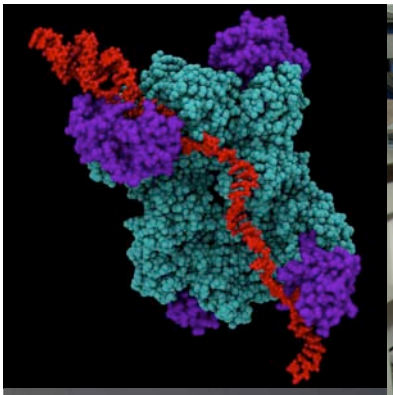
Professor Daniel St Johnston, Ph.D., FRS, FMedSci is Professor of Developmental Genetics in the Department of Genetics, Wellcome Trust Principal Fellow and Chairman of the Wellcome Trust/Cancer Research UK Gurdon Institute, which focuses on developmental and cancer biology. He received his B.A. in Natural Sciences from Cambridge, UK and his Ph.D. in Cellular and Developmental Biology from Harvard, Massachusetts, where he worked with William Gelbart on the molecular characterization of decapentaplegic. Daniel then moved to Christiane Nüsslein-Volhard's laboratory at the Max-Planck-Institut für Entwicklungsbiologie in Tübingen as a postdoctoral fellow, where he studied how the main body axes of the fly become polarized during oogenesis. He has continued this work in his own laboratory in Cambridge, UK, and was awarded the European Molecular Biology Organization Gold Medal in 2000. Daniel studies pattern formation in embryogenesis, in particular how cells become polarized and how this polarity directs their organisation and behaviour in vivo.

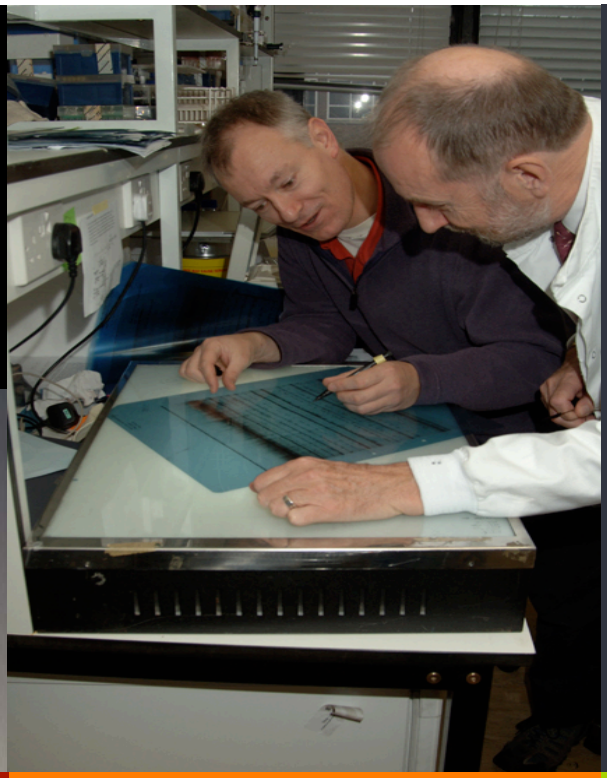
Professor Jim Kaufman, Ph.D. is Professor of Comparative Immunogenetics in the Department of Pathology. Jim was an undergraduate in chemistry at the University of Washington and did his Ph.D. with Jack Strominger in the Department of Biochemistry and Molecular Biology at Harvard University. He was then recruited as an independent member scientist to the Basel Institute for Immunology in Switzerland, after which he ran the Immunology division at the BBSRC-sponsored Institute for Animal Health at Compton. He moved to Cambridge in 2007. Jim has made major contributions to our understanding of the structure and function of the chicken Major Histocompatibility Complex, from which he has been able to reconstruct some key features of the origin and subsequent evolution of the MHC and the vertebrate adaptive immune system.

Professor Roger Hardie, Ph.D., FRS is Professor of Cellular Neuroscience in the Department of Physiology Development and Neuroscience (PDN). He is distinguished for his versatile and extensive studies on invertebrate visual transduction, which have transformed our wider understanding of cell signalling. In particular, his demonstration that the Drosophila trp and trpl genes code for selective calcium channels was the seminal observation that launched the TRP channel field, now a major part of calcium signalling and a focus of medical research. His subsequent investigations using these prototypical dTRP channels have been marked by elegant technological innovations, leading to groundbreaking and novel insights into the complex regulation of this class of channels by calcium and by lipid messengers.



Professor Andrea Brand, Ph.D., FRS, FMedSci. is Herchel Smith Professor of Molecular Biology and a member of the Department of Physiology, Development and Neuroscience and the Gurdon Institute. Andrea read biochemistry at Oxford University and did her Ph.D. at the Medical Research Council's Laboratory of Molecular Biology. She then moved to Harvard where she was a post doctoral fellow studying tranmscription – first in yeast with Mark Ptashne and then in Drosophila with Norbert Perrimon. She then moved to the Gurdon Institute where she is a Wellcome Trust Principal Fellow. Andrea is distinguished for her pioneering work on the development of the nervous system, deciphering the genetic networks that regulate neural stem cells in Drosophila. By employing sophisticated and innovative live imaging techniques, she has elucidated how cell fate determinants become localised to one side of a cell, allowing neural precursors to divide asymmetrically in a stem cell-like fashion.





Which research subject is the most challenging area for you?

Cancer & cell signalling

Infection & immunity

Biochemistry & Molecular biology

Developmental biology

Neurosciences

Cancer and Cell signalling

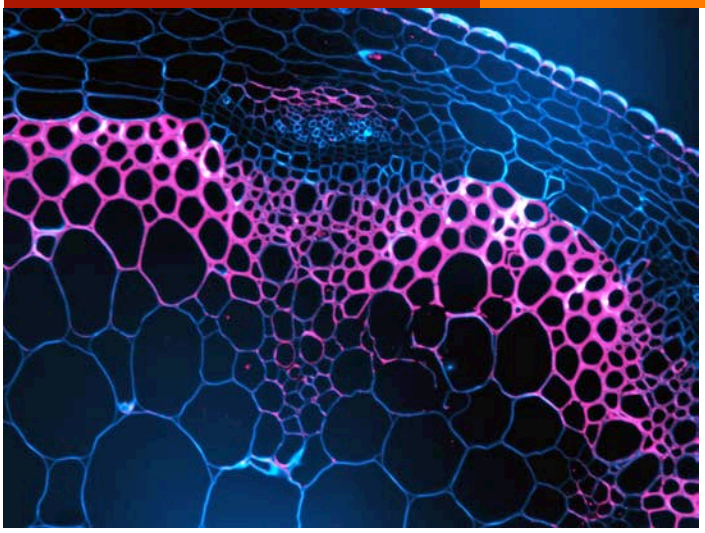
Cell signaling deals with how information is transferred between different cells and transduced within each cell: in effect, such signals indicate to the cell whether it should divide, differentiate, move or die. Cancer is a disease where such signalling is corrupted: cells divide when they shouldn't, stay alive when they should have died, fail to differentiate appropriately and move around the body establishing colonies in other tissues. Members of the Cancer and Cell Signalling group use a wide variety of cell and animal-based systems to explore how signaling works in normal and cancerous cells and tissues. Students will employ a wide variety of cell and molecular biological techniques, including cell culture, protein and nucleic acid chemistry, cloning and protein expression, protein purification, mass spectrometry and, in certain laboratories, magnetic resonance imaging, advanced microscopy, histopathology and generation of genetically engineered mice. Laboratories focused directly on cancer also employ a variety of genomic and proteomic tools with which to identify and map mutations in signaling pathways.

Infection and Immunity

Infectious diseases kill millions of people each year around the globe. The need for research in this area is as great as ever thanks to the emergence of new infections, such as the H1N1 and H5N1 influenza viruses, the rise of others, like Lyme disease and Dengue fever, and the continued absence of vaccines for many lethal pathogens including malaria and HIV. Furthermore, the tools we have to treat infectious diseases are waning thanks to rapid increases in drug resistance by many pathogens. Due both to overuse and to the innate ability of microorganisms to evolve at a tremendous speed, we are quickly running out of effective antibiotics. These issues highlight the gaps in our knowledge of both the pathogens that cause disease and of our own immune system which has evolved to fight them. Members of the Infection and Immunity disease group study the biology of pathogens and the fundamental mechanisms of our own immune system as well and the interactions between the two. Students may study bacteria, viral or protozoan pathogens, how they replicate and spread and how they subvert their host's immune systems for their own benefit. Others will study the innate and adaptive immune systems, the molecular basis of inflammation, how we discriminate between self and non-self, the immunology of pregnancy and how immune cells respond to antigenic signals.

Biochemistry and Molecular Biology

Biochemistry is the discipline that seeks to understand how the chemical processes in living organisms interact and, together, build a self-sustaining and replicating organism. However, contemporary biochemistry is not limited to merely the chemistry of life but has overlapping ties to structural biology, cell biology and cell signaling. Life would be impossible without



Life would be impossible without large macromolecules: nucleic acids harbour our genetic information while proteins mediate most of the structural, catalytic and dynamic processes that underpin biology.

Structural biology seeks to understand how the unique 3-dimensional structures of macromolecules dictate and explain their functions. Members of the Biochemistry group study diverse areas – how tissues are organized, how structures of large complexes within cells are linked to their functions, plant biochemistry and the reprogramming of plants to generate biofuels, how life evolved and, even, how it might be redesigned. Students will employ a wide variety of techniques and technologies, including classical biochemical analysis of polysaccharides and proteins, isolation and purification of cells and their constituents, sophisticated cell and tissue imaging and microscopy, RNA biochemistry, cloning, chemical biology and microfluidic technologies (lab-on-a-chip). Students also have access to the full range of biophysical tools, including X-ray crystallography and NMR spectrometry, computational biology to resolve and dock molecular structures, surface plasmon resonance to explore protein interactions, mass spectroscopy and proteomics.

Developmental Biology

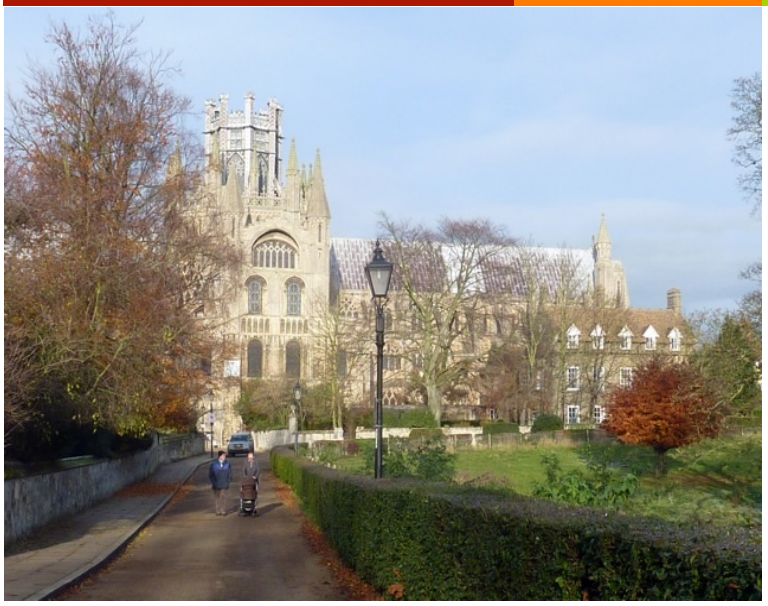
Developmental biologists study the processes by which organisms grow, develop and, in complex organisms, regenerate after injury. Modern developmental biology addresses the genetic control of cell growth, differentiation and "morphogenesis", which is the process that gives rise to tissues, organs and anatomy. Over the past decade, it has become clear that complex differentiated tissues are generated (and regenerated) from a small number of “stem” cells that reside in specialized somatic niches and retain the potential to both self-renew and differentiate into a variety of differentiated cell types. The relationship between such adult stem cells and their fully differentiated progeny mirrors the relationship between the pluripotent embryonic stem cells in the inner cell mass of the early stage embryo blastocyst that differentiate into all the varied cell types of the adult. Students will have the opportunity to study a variety of developmental systems, including model organisms like *Drosophila* and the developmentally invariant nematode *Caenorhabditis elegans*, vertebrate systems like the developing retina and haematopietic systems, and the roles played by stem cells in organogenesis and tissue regeneration.

Neuroscience

Neuroscience is the discipline that seeks to understand how our brain works: how we think, how our nerves communicate and sense information. More than any other discipline, neurobiology deals with how the whole (the brain) is greater than the sum of its parts (the nerves that make up the brain). Members of the neurobiology group explore these extremes: how nerve cells (neurons) function and interact at the molecular and cellular level, how we perceive various nervous signals such as pain, and how ensembles of neurons conspire to generate behaviour and thought. Students will be involved in projects that explore detailed ultrastructure of neurons and synapses, others that investigate the biochemistry of neurotransmitters and the cell biology of how they are stored and released, the dynamics of signaling fluxes in neurons, delineating the neural circuitries that regulate behaviour, and the molecular biology and histopathology of neural degenerative diseases. Students will employ a wide range of cell and biochemical techniques, including electrophysiology, advanced confocal imaging and dynamic microscopic imaging of ion and signal fluxes within cells, fluorescence energy transfer, atomic force microscopy to examining the ultrastructure of ion channels and ionotropic receptors, mass spectroscopy and bioenergetics. Some will also gain experience in neuroanatomy and histopathology.

Getting to Cambridge:

Cambridge Science Summer School offers you a hassle free journey to our University. We will help to arrange return flight tickets and pick-up and drop-off service from Heathrow airport to our departments/colleges.



Visa information

Citizens of EU countries do not need a visa to participate in the Cambridge Science Summer School. Citizens of other countries will usually need to obtain a student visitor visa to participate in the Cambridge Science Summer School. Please visit the UK Border Agency website for more information, especially the student visitor visa and eligibility pages.

Obtaining a student visitor visa

Citizens of some countries (e.g. USA, Singapore, Hong Kong SAR, Brazil, Canada) can obtain a student visitor visa on arrival at a UK airport. For example, you are a US citizen and may have been residing outside the US for a period of time, but you should be able to obtain a student visitor visa on arrival at a UK airport. Citizens from other countries (e.g. China, India) will need to apply for a student visitor visa in advance. Students must check their entrée and visa requirements for entering the UK Border prior to their arrival via http://www.ukvisas.gov.uk/en/doineedvisa/ to see if they will need to apply for a visa before coming to the UK. If students can obtain the student visitor visa at the airport when they arrive they will need to show immigration officials two types of documentation:

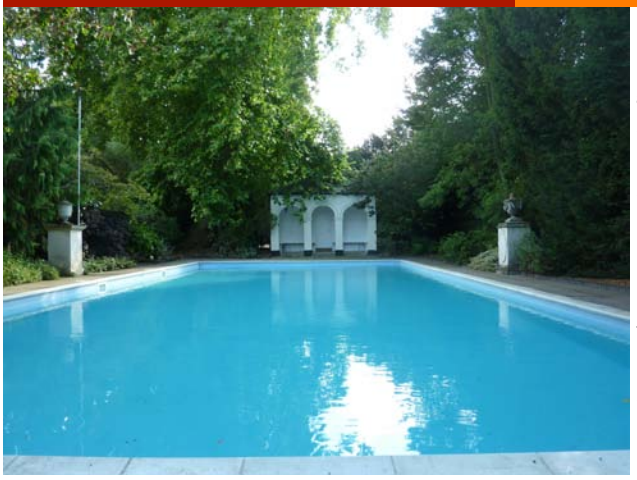
1. Letter of acceptance: The official letter of acceptance to the programme will be issued by the participating Departments or Research Institutes once the programme fee has been paid.
2. Additional supporting documents Students should refer to the UK Border Agency's documents to bring to the UK pages for general information on supporting documents. The official letter of acceptance will explain that the Programme fee includes tuition and accommodation etc. Students may be asked to show evidence of additional financial support (at least £600 per month) which can be done by showing one of the following documents:

- the last three months of official bank statements, showing adequate funds to support the student for the full duration of his/her stay;
- a letter from the student's parents guaranteeing financial support to him/her, as well as three months of bank statements demonstrating sufficient funds to do so;
- a letter from the scholarship or loan provider confirming the amount of financial aid and its intended use. If this amount is less than £600/month, this evidence can be combined with either of the two items listed above.

If the student's citizenship means he/she must apply in advance for a student visitor visa to attend the programme, more information on applying for a visa can be found on the UK Visa Services website.

Accommodation

The Cambridge Science Summer School offers you the opportunity to live in one of our University Colleges. Each college varies in style, history, character, size, age restriction and even gender. All Colleges provide residence for undergraduates during term time and some accommodate graduate students all year round. Undergraduates are supervised during the academic year by senior members of the College such as research fellows or College teaching officers. Colleges also provide funding and/or accommodation for some of the senior research posts in the University. The Colleges are self-



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governing bodies with their own statutes, endowments, possessions and resources. Each college provides its own community for students who come from different ethnic backgrounds to read different subjects, to share their knowledge and have fun together through Formal Halls (dining in College hall) and residing in Colleges or College owned properties. There are 31 Colleges in Cambridge, of which Peterhouse, founded in 1284, is the oldest, and the newest College is Robinson, founded in 1977. Three Cambridge Colleges admit only women (Murray Edwards, Newnham and Lucy Cavendish). Two Colleges admit only postgraduates (Clare Hall and Darwin) and four more admit both mature students and graduate students (Hughes Hall, Lucy Cavendish, St Edmund's and Wolfson). All other Colleges admit both undergraduate and postgraduate students with no age restrictions.

All College rooms are traditional single-occupancy rooms with a single bed, a desk and chair, a wardrobe, free internet access and shared

facilities including bathrooms, toilets, laundry room, kitchens, chapel, gardens, and sport grounds. The rooms we provide are those normally occupied by Cambridge undergraduates during the academic year, so you will be living as a Cambridge student. The Colleges' extensive gardens and quiet courtyards provide a beautiful place to live and work.

Dining is an important part of College life. Over the summer, students will be able to attend at least one dinner, known as a 'Formal Hall' with world-class scientists or eminent leaders. These are three-course candlelit meals usually enjoyed in a beautiful dining hall with students, faculty, and college senior members (fellows). Heated debates often break out amongst students at such dinners during term time. This Cambridge dining tradition dates back hundreds of years.

Excursions

One of England's most magnificent cathedrals, Ely, is just a short journey from Cambridge. It is known as the 'Ship of the Fens' because of its unique Octagon tower that rises majestically into the wide blue sky and stands tall over the fens in the small historic city of Ely. Ely Cathedral is the only UK building listed as 'One of the seven medieval wonders of the world'. The cathedral has been a prominent film location for the Elizabeth I sequel 'The Golden Age' starring Cate Blanchett, Henry's VIII 'The Other Boleyn Girls' and, most recently, 'The King's Speech'. Although Ely is a small city, it is very pretty and full of history dating back to the 11th century. You can follow the city's heritage public art 'eel trail' and walk into its past, experiencing life in the medieval period by entering the home of Oliver Cromwell, one of Ely's best-known historical figures. You can also stroll along the River Ouse, walking through the sweeping willows hanging over the water on both sides of the river and enjoy the late sunset blending into a golden horizon with a light Summer breeze. Ely's waterside is also a great place to feed the resident ducks and watch the swans drifting along the current.

Directly south of Cambridge is one of the great sights of East Anglia - Audley End - a fine example of England's stately homes set in a spectacular landscaped park. Audley End was built as an outstanding Jacobean mansion on land given to Henry VIII's Lord Chancellor, Thomas Audley. It is a great place to find out more about British Kings, lords and ladies, barons and earls who have lived here and left their marks over five centuries. The house itself is elaborately decorated with a collection of fine arts and treasure. You might also enjoy the colourful 19th century parterre garden and a walk through the restored fairytale stable, meeting the resident horses and a Victorian groom along the way. To round off the day, you can enjoy a cup of tea with a slice of cake in the Cart Yard Café next to the acclaimed walled kitchen garden with its lovely glasshouses and vinery growing original Victorian varieties of fruit and vegetables.

For horseracing enthusiasts, Newmarket, the home of British Horseracing, is just 20 minutes by train from Cambridge. One of the very first British races won by King Charles II, the Town Plate, took place in Newmarket in the early 17th century. Today, over 2500 racehorses train on the gallops from sunrise, every morning. It can be a very fun day out experiencing an adrenaline-driven race event and also popping into the National Horseracing Museum to learn about one of the great traditions of British culture. If the time allows, pick your favourite tour to absorb the atmosphere further.

Further East from Cambridge, beyond Newmarket, you come to a glorious small town called Bury St Edmunds, once home to one of the most powerful monasteries in Medieval Europe. Bury St Edmunds grew up around the powerful abbey of St Edmund in the Middle Ages. People have came from all over the world in the last 500 years to worship at the shrine of Edmund, the martyred Saxon King of the East Angles, who was patron saint of England until George took his place. Bury St Edmunds' motto is "Sacrarium Regis, Cunabula Legis" - Latin for "Shrine of a king, cradle of the law". Legend has it that at the high altar of the abbey 25

Sandringham Estate

(Continued)

met at the shrine of St Edmund, swore an oath in 1214 to force King John to accept their Charter of Liberties, known since as Magna Carta. The document was a significant step towards English democracy, limiting the powers of the monarchy and was vital for the development of today's legal system. It is a great day out to experience the Norman period by entering the Norman Tower, built between 1120 and 1148 as the gateway to the abbey precincts, and then to enjoy a picnic in the splendid Abbey Gardens with its 40,000 summer blooms planted to create a splash of colour. Alongside the astonishing history of this ancient town, the locally brewed beer from the UK's largest British owned brewery, Greene King, can be refreshing on a hot, sunny summer day. You may also enjoy freshly brewed beer in the Nutshell Pub in the centre of town, which is noted in the Guinness Book of Records as Britain's smallest pub, offering little more than eight square metres inside a Grade II listed building.

There are many other beautiful attractions just a short drive from Cambridge, for example the Sandringham Estate (the Norfolk retreat of HM The Queen set in a stunning 24 hectares of gardens), Cromer (a British seaside town and home to the very famous tasty Cromer crabs, ideal for seafood lovers), Wicken Fen (a lost landscape and remnant of ancient fenland), Welney (a birdwatcher's paradise) and, if this is not enough, the vibrant metropolitan city of London is just 45 minutes away on the train that runs very frequently throughout the day.

CSSS offers you local guidance by our departmental graduate students and postdoctoral research scientists. They will show you around Cambridge to familiarise you with the town and also organise fun events for you to join and experience. So you can easily seek the help and advice you require to enjoy a smooth stay in Cambridge.

Ruins in Bury St Edmunds

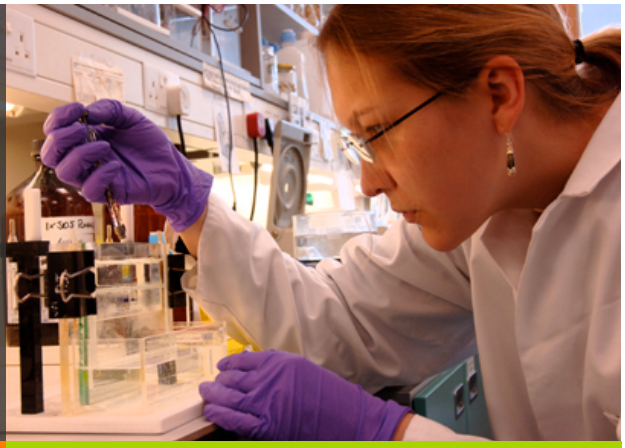
How to apply:

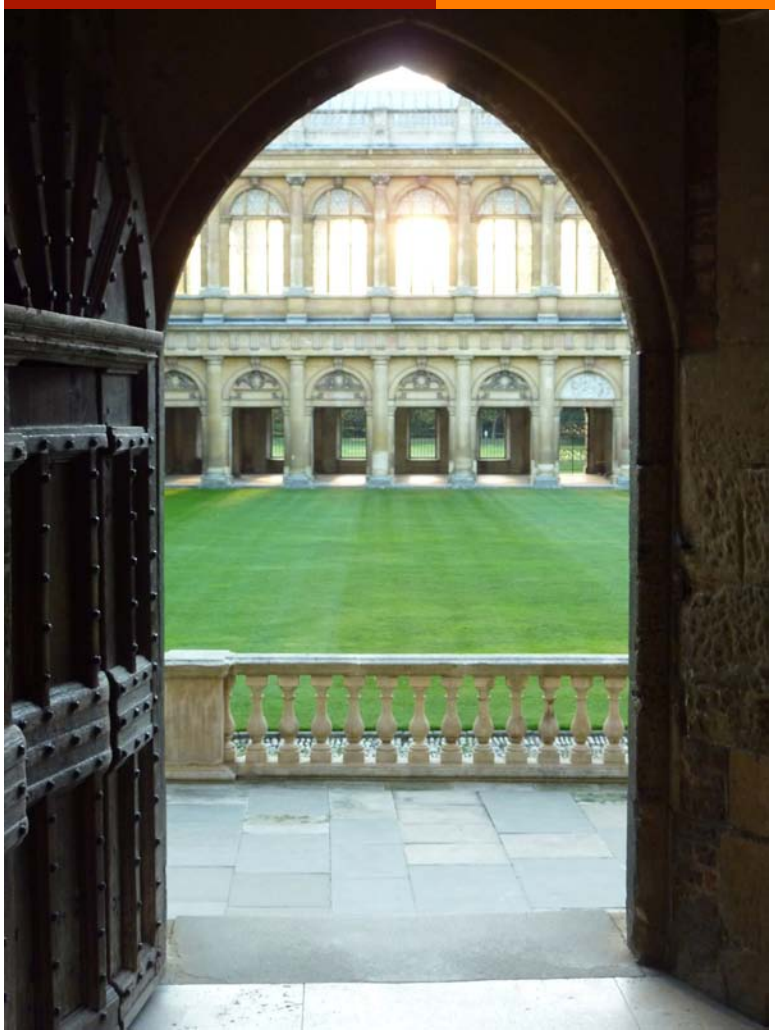
For further information on the Cambridge Science Summer School, including the application procedure, application form and details of fees and scholarships, please write to the Cambridge Science Summer School (CSSS2013@bioc.cam.ac.uk). If you are a member of one of our partnered universities, please contact it for information on sponsorships of the Summer School. If you are a student at an academic institution not yet partnered with us, please ask your host university to contact the Programme Director.

In 2012, about 50% of our CSSS students were awarded scholarships from various funding bodies e.g. their home universities, foundations and the CSSS itself.

“I’m always surprised how little people know about anything. I’m puzzled by it”

Max Perutz





"I spent eight weeks working as a summer student in Prof. Evan's Lab. This was a great experience and I learned a tremendous amount in experimental work and how world class research is carried out. This research experience was far more interesting and engaging than as an undergraduate.

I was mentored by an excellent supervisor - Deborah Burkhart - who provided constant help and guidance. During this short time, I learned basic laboratory techniques and simple experimental calculations. I was taught many different advanced techniques which I would not have had an opportunity to carry out during regular undergraduate teaching. These included Western Blotting, Tissue Culture, Immunostaining, Flow Cytometry, RNA extraction and qPCR. Performing these experiments allowed me to contribute a small part in an exciting ongoing research project.

My project involved working on transgenic mice which had their Ras inhibited when treated with doxycycline via a dominant negative human Ras with the aim to assess therapeutic effects of Ras inhibition in tumours. Specifically, I helped detect the presence of the inserted human Ras gene in different mice organs and compared the difference between promoters. I also optimised conditions for Mouse Embryonic Fibroblast proliferation experiments and showed the addition of doxycycline inhibited proliferation which was also reversible. Finally, I detected various downstream effects of doxycycline addition which helped to confirm Ras was being inhibited.

This research experience not only taught me practical techniques but also processes in scientific research. I learned to read and discuss papers with my supervisor and they related and could contribute to possible experiments for our project. I also learned to plan and design my own experiments and execute them successfully. I was also able to attend lab meetings and listen to work being presented by others and discussions for further experiments and improvements."

Haixi

What did the CSSS Students think?

Cambridge Science Summer School

This summer school experience is absolutely one of the most memorable experiences I so far had. It is a very precious opportunity to experience research here in Cambridge. The course has been so well structured that it is an excellent occassion to develop ourselves for research science. The lectures, workshops and group presentations certainly help us develop the relevant skills to work in science and inspire us to pursue questions.
The course is also balanced by the many enjoyable social activities including college dinner, excursions and wine tasting

Afterall, this is an exceptional experience which I will pursue if I have to choose again.

Victor W.

It has been a good 8 weeks immersed in a scientific environment. The programme was very well organised. I was very impressed with the quality of the lecture series. The social elements not only spiced up the experience, but also gave us a really great opportunity to get to know each other and the different labs we were in. I am also very grateful to the Croucher Foundation for their generous support. The programme has made me realise what sort of research environment I would like to be working in in the future. I wish the very best to the CSSS in bringing more young minds to Cambridge.

Theodosia 2012

Cambridge Science Summer School

My initial motivation to participate in this summer school was to simply use it as a leverage to ~~greet~~ reach my goals. Being a typical family-centric Asian, I didn't quite relish the idea of travelling so far out of my home country and meeting people foreign to me. Still, the importance of my goals far out-weighed any reservations I might have had and I decided to take the leap.

In retrospect, this has turned out to be one of the best decisions I have ever made for myself. Having the chance to interact and communicate with people from the other side of the world didn't turn out to be quite as intimidating as I thought. In fact, I realized that I actually enjoyed it! With this experience and realization comes confidence in dealing with people not only from another culture but even of my own. My world just got bigger.

Having the chance the work in the McNaughton Lab also made me realize the importance of all the details that go into planning an experiment - down to the mixing & preparation of reagents. As an undergraduate student, one hardly gives any thought to these things. But as a scientist, these are the things that matter most because it can affect the final outcome of your experiment. It is better that I realize this now than later.

All in all, I had an extremely enjoyable time here. For a first summer school, I think this programme has been really well thought out. I think one thing that most summer school's lack is the opportunity to socialize with each other (most students only come together during classes). I was thus pleasantly surprised that there were so many opportunities to bond with each other for this summer school, such that at the end, everyone was talking to each other like old friends. I think this is an important factor that sets CSSS apart from the other summer schools.

Cambridge Science Summer School

Kelvin MIU

Science has been an everlasting subject as there exists endless exploration for all of us to enjoy. I always love science but is quite reluctant to express this to others. Coming to Cambridge makes me start to realise science is really all about sharing.

Two months ago, a bit frightened to what is going to meet, what is going to happen, would I get along with others, etc. Two months later, cherishing the trips we went, the chats we had, the passion persists. First time ever, I share ideas freely, discuss about interesting matters; arguing about facts, experimenting own ideas or thoughts. Cambridge summer school forced me in a self-reflecting process — to revisit my heart, my true desire, to be a scientist.

Unfortunately, two months had been too short for me. Staying in a pool with brilliant people, talking about cool stuff, is just not enough for me. I enjoyed every single moment that I had in this inspiring programme. I fulfilled my passion to work seriously in big ideas. I tried to interact with different people from all different places around the world, working as a community, getting connected as lifelong friends and cherishing good memories.

I would like to thank Joya and Gerard, two amazing people that shaped me and brought me most touching moments I had. The programme is really very successful and I am missing my home here in Cambridge already!

CSSS is a lot more than a summer school. A lot of surprise, a lot of new things for me. I'm excited about everyday's plan and activities. I made new friends and learnt a lot from them. I love the busy and meaningful life here. Think hard. learn hard. play heard! thank you for ~~the~~ everything in the summer school!

Huizhong.

Cambridge Science Summer School

It is not possible to tell how wonderful the summer school is in this A4 paper! In the dream-like ~~[illegible]~~ two months, we worked with world-class scientists, heard from Nobel Prize winners, had a deep taste of British culture and became friends with the kindest and smartest people. For anyone who is pursuing his or her dream in science, the summer school provides intensive and best-quality training. Apart from this, all these friendly people here made us not feel "foreign", but a member of the scientific society in Cambridge. Moreover, the organization of every events is just flawless, from which we can see the devotion of our great director Joyce (and vice director Gerard, ahaa).

Happy time always flies easily, tomorrow I'll leave ~~this~~ lovely place. Yet I am going to do my best to come back, this time as PhD student.

Mo Zhao
Peking University

What you, the CSSS student, will get from the Programme

The Cambridge Science Summer School Programme directly immerses you in the best experimental science, offering unique interactions with eminent research scientists in a world-class scientific laboratory environment. We will train you in how to generate experimentally testable hypotheses, how to conceive, plan, execute and interpret experiment. Science is a deeply social enterprise, requiring the ability to communicate and enthuse others with your data, and to interpret wisely the experiments of others. We will therefore offer you instruction on how to present data, receive and use constructive criticism of your own experiments, and how to interpret and critique published scientific papers through the use of journal clubs and discussion groups. Our Programme participants enjoy full departmental membership, with access to all the facilities within your host department, including IT access and support, use of the departmental library, A/V support for presentations, and admission to all departmental seminars, journal clubs, discussion groups and social events. At the end of your successful completion of the Summer School, we will provide you with a formal certificate of course

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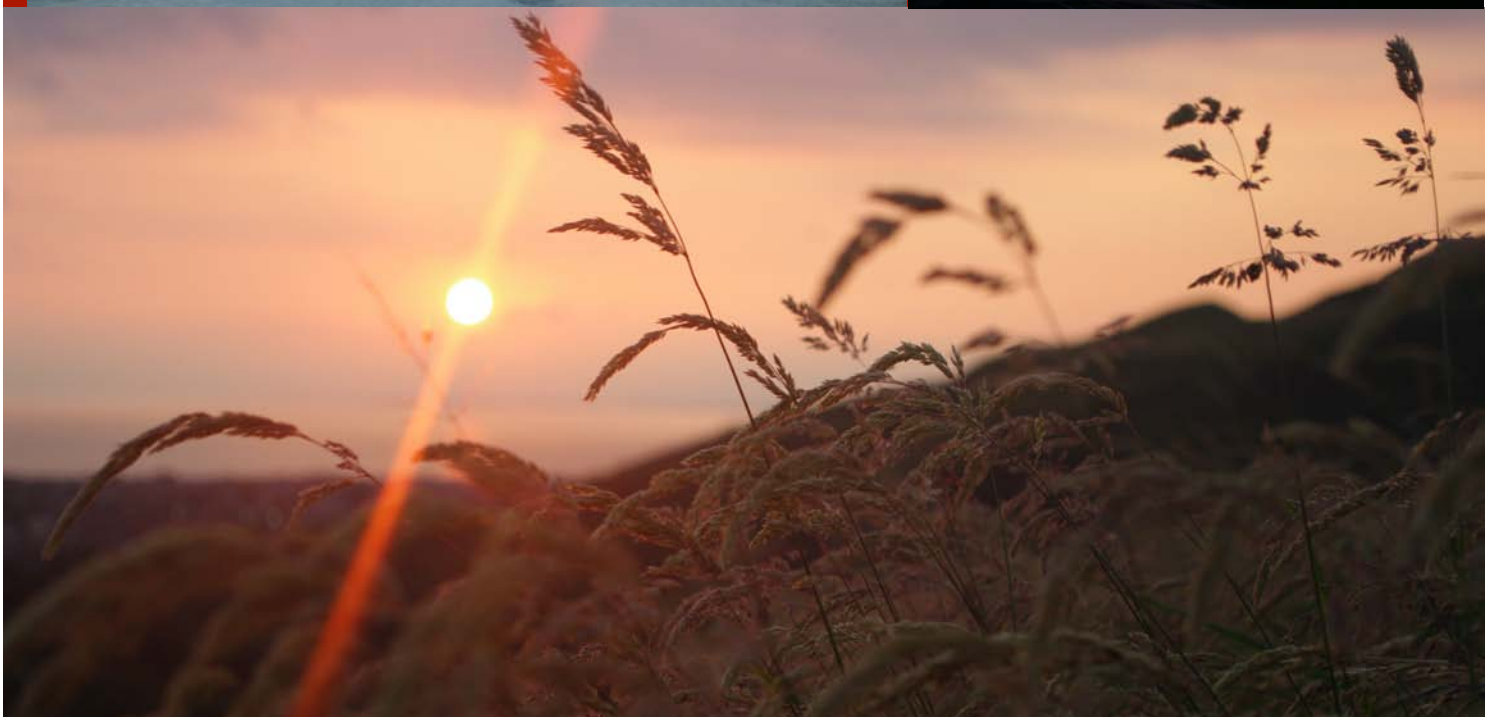
completion signed by the Programme Director and the Heads of participating Departments (Biochemistry, Pathology, Pharmacology and PDN), indicating that you have achieved the requisite level of scientific acumen and endeavour. In addition, your laboratory mentor will provide you with a detailed description about the project you undertook and the techniques and technologies that you have used. Both documents may be used by you for future career development and, we hope, support your future interest in returning to Cambridge as graduate students or post-doctoral fellows.



Cambridge Science Summer School