UNIVERSITY OF CAMBRIDGE
enterprise

Annual Review 2012

From the Pro-Vice-Chancellor (Research)

Professor Lynn Gladden

In Cambridge, we are committed to achieving excellence in research and scholarship, and to ensuring that our research contributes to the well-being of society. The excellence and diversity of our research means that in addition to our strength in fundamental research, we are well-placed to make significant contributions to the economic growth of the UK.

The University of Cambridge sits at the heart of one of the most productive technology clusters in the world. The 1,500 companies in the cluster have a combined annual turnover of £11.8 billion and employ more than 53,000 people. The constant exchange of ideas between the University and the companies in and around Cambridge is one of the many characteristics that makes the cluster so successful.

The foundation for innovation is a steady supply of good ideas, and the University's strength in stem cells and regenerative medicine, cancer research and treatment, energy and global food security is second to none. However, the game-changing innovations of today are only made possible by yesterday's fundamental research; continued government support and funding of fundamental research is vital to ensure that the UK continues to be a world leader in using the ingenuity and creativity in its universities to find solutions to the problems facing our world.

Professor Lynn Gladden
Pro-Vice-Chancellor (Research)
University of Cambridge

From the Chief Executive

Dr Tony Raven

The impact of Cambridge research can be measured in many different ways: from the number of patents filed and licences signed; or the number of lives saved by ideas developed by our academics; or by the enormously successful cluster which has grown around the University: home to 12 $1 billion companies, of which two are $10 billion companies.

The world-leading research developed by University academics has been translated into solutions, products and companies that are a benefit to both society and the economy. Over the past five years, income from licensing, consultancy and equity transactions has exceeded £46 million. Over £38 million of that amount was returned to the University and to the researchers whose ideas are the foundation of so much of the innovative activity in and around Cambridge.

This past year, the Cambridge Enterprise team completed 84 licences, signed 201 consultancy contracts and returned more than £162,000 to our evergreen seed funds. Additionally, our portfolio companies reached an impressive milestone; more than £1 billion in follow-on funding raised since 1995, demonstrating the confidence that industry has in the ideas and solutions originating from University research.

I would like to thank the Cambridge Enterprise team, as well as our directors, academic partners and business colleagues, for their continued support in ensuring the continuing and future impact of Cambridge innovation.

Dr Tony Raven
Chief Executive
Cambridge Enterprise Limited

Industry partners

The University's research and expertise carries enormous value the world over. This can be seen in the calibre of companies which work with our academics to find solutions to business problems, or help develop Cambridge research into products with real impact. Some of the companies we are working with include:

Key performance indicators

Cambridge Enterprise is responsible for the commercialisation of University of Cambridge research. The company delivers its mandate through three overlapping business units: technology transfer services, consultancy services and seed fund services. Over the past financial year, Cambridge Enterprise achieved the following:

£9.1 million
income from licensing, consultancy and equity transactions, of which £7.5 million was returned to the University, academics and departments

476 disclosures
comprising 149 IP disclosures, 226 consultancy disclosures and 101 new business ideas

84 licences
signed, 65 for commercial purposes and 19 for other purposes, including research licences

739 active agreements
under management, including 222 research licences

167 patent applications
filed, of which 64 were priority applications, 42 were PCT applications and 61 were national applications

£1 billion
in follow-on funding raised by Cambridge Enterprise portfolio companies since 1995

More than 1,000 researchers
supported by Cambridge Enterprise, at all stages of the commercialisation process

£17.5 million
in translational funding won by researchers with the support of Cambridge Enterprise

66 companies
in the Cambridge Enterprise portfolio, 48% of which are currently selling products

80% survival rate
for investee companies (after three years)

201 consultancy contracts
agreed, an increase of 10% over 2010/11

£1.04 million
invested in patents and proof of concept by Cambridge Enterprise

Bringing Cambridge research to market

Taking fundamental research from an idea to a product or business takes time, funding and support. Cambridge Enterprise has its own proof of concept fund to provide early stage support for inventions, and also supports translational funding applications.

Proof of concept and translational work has become an increasingly important area for Cambridge Enterprise over the past several years. The team supported 44 applications in 2011/12: 33 of these were successful, with eight pending. Funding and support from research councils, charities and other funding bodies allows important University research to take those critical early steps from laboratories to solutions which have real impact on people's lives.

Researchers from the Department of Pharmacology and the Department of Anaesthesia, along with contract research organisation Argenta, hope to develop a new drug for the treatment of chronic inflammatory and neuropathic pain, which affect about one in seven people in the UK.

With £4.4 million in funding secured from the Wellcome Trust's Seeding Drug Discovery Initiative, Professor Peter McNaughton and his collaborators will shortly begin the process of developing such a drug.

Alpha-1 antitrypsin deficiency is one of the most common genetic disorders in the UK, leading to life-threatening liver conditions including neonatal hepatitis, cirrhosis and hepatocellular carcinoma, as well as lung conditions such as early onset emphysema. Currently, the only available treatments are liver transplantation for cirrhosis and protein replacement therapy for emphysema.

A new collaboration between the University and global pharmaceutical company GlaxoSmithKline (GSK), will build upon the work of Professor David Lomas and his colleagues at the Cambridge Institute for Medical Research. The partnership, part of GSK's Discovery Partnerships with Academia initiative, will aim to discover and develop new medicines to treat these liver diseases.

An effective programme of surveillance is required to monitor and control the spread of infectious diseases, especially healthcare associated infections like MRSA, which represent a major risk to patient safety as well as imposing a financial burden to hospitals, individuals and society.

With funding from the Wellcome Trust and the Department of Health the research group of Professor Sharon Peacock will work with colleagues at Cambridge University and the Sanger Institute to use sequencing technology to provide information on real time bacterial spread and outbreaks in hospitals and the community. This will enable disease trends and serious outbreaks to be tracked and effective vaccines and control measures to be designed and monitored.

The benefits of this project could be seen when the source of a recent MRSA outbreak in the Special Care Baby Unit at the Rosie Hospital in Cambridge was tracked using real-time sequencing, allowing the carrier to be treated quickly, while removing the risk of further spread.

The £17.5 million in translational funding won in 2011/12 by University researchers with the assistance of Cambridge Enterprise is helping develop new therapies and treatments for conditions which affect millions worldwide, including liver disease, chronic pain and healthcare-associated infections.

Photo credit: Ed Cartwright


Amantys' products are helping
reduce waste in the energy sector
by detecting faults before they occur.

Making renewables more efficient

Amantys is improving reliability and efficiency in the power electronics sector, a $3 billion per year industry which is growing by 10% annually. The company, based on research from the Department of Engineering, has succeeded despite being a "start-up in an industry without start-ups."

The power electronics industry is considered to be a conservative one, with high barriers to entry and a perceived reluctance to adopt new technologies. Despite this, Amantys has succeeded by demonstrating the benefits of combining University innovation with industry expertise.

The company was formed in 2009 by Dr Patrick Palmer, Reader in the Department of Engineering, and three former ARM employees, Bryn Parry, Mark Snook and Pete Magowan. Their objective was to commercialise Dr Palmer's method of improving the reliability and efficiency of the electronic switching products which are used in applications such as wind turbines, locomotives and large motor drives.

Dr Palmer has been conducting research on insulated gate bipolar transistors (IGBTs) for more than two decades. IGBTs are semiconductor devices which enable the control of large currents by the application of low level voltages or currents, allowing electronic devices, to control high power electrical equipment.

A problem often associated with IGBTs is effectively controlling transient voltages during switch-on and switch-off of the devices, limiting their application range. One of Dr Palmer's main areas of research has been improving the switch-on and switch-off characteristics and control of IGBTs. In the course of this work, two patents were filed by Cambridge Enterprise. These patents were licensed to Amantys in July 2010 and formed the initial core intellectual property of the company.

"The worldwide appetite for energy is insatiable and increasing rapidly each year, meaning that for both renewable and non-renewable energy sources alike, waste is the enemy," says Bryn Parry, CEO of Amantys.

Power is converted during transmission, distribution and consumption; effective switching at medium and high voltages governs the energy efficiency across this spectrum. The challenge is to improve performance and reliability, which demands close monitoring and control of switching characteristics.

Amantys has developed gate driver products based on Dr Palmer's original research to drive IGBT modules. These gate drives add more intelligence to the power switching process through the addition of Amantys Power Insight™, which integrates software running on an ARM microprocessor to provide data about the health and performance of the system. This enables problems to be detected at an early stage, and opportunities to improve reliability to be identified.

In applications such as wind turbines, approximately 3% of the energy generated is lost in the form of heat, which for a five megawatt turbine equates to 150 kilowatts, or the same amount of heat produced by 50 three-bar electric fires. That heat is not only being lost from the energy output, but the heat itself can be hugely damaging to power electronics, affecting reliability. Amantys' products can reduce these losses and outages and detect early signs of failure.

In the past 18 months, Amantys has tripled the size of its team and closed a Series 'A' funding round of £5 million, led by Moonray Investors, part of Fidelity International, and ARM plc.

The role of stem cells in developing new drugs

Cambridge is a world-leader in stem cell research. There are now 26 stem cell laboratories across the University, which have attracted some £95 million in funding. Commercial opportunities in this important area of research investment are now being developed with the assistance of Cambridge Enterprise.

The potential therapeutic applications of stem cells – such as regenerating damaged tissues or organs – have generated a great deal of interest over the past decade. While these types of applications are exciting, it is a long journey from lab to clinic. The most immediate impact of stem cells on human health will most likely come from their use in the development of new drugs.

The ability to generate stem cells by reprogramming cells from patients' skin has revolutionised human stem cell research. These cells, known as human induced pluripotent stem cells (hIPSC), can be differentiated into almost any cell type, allowing the opportunity to have a ready source of human cells for testing new therapies.

DefiniGEN, a new spin-out company from the University, is one of the first commercial opportunities built on the University's expertise in the area of stem cells. The company is based on the research of Dr Ludovic Vallier, Dr Tamir Rashid and Professor Roger Pedersen of the Anne McLaren Laboratory of Regenerative Medicine; it will supply hIPSC-derived cells to the drug discovery and regenerative medicine sectors.

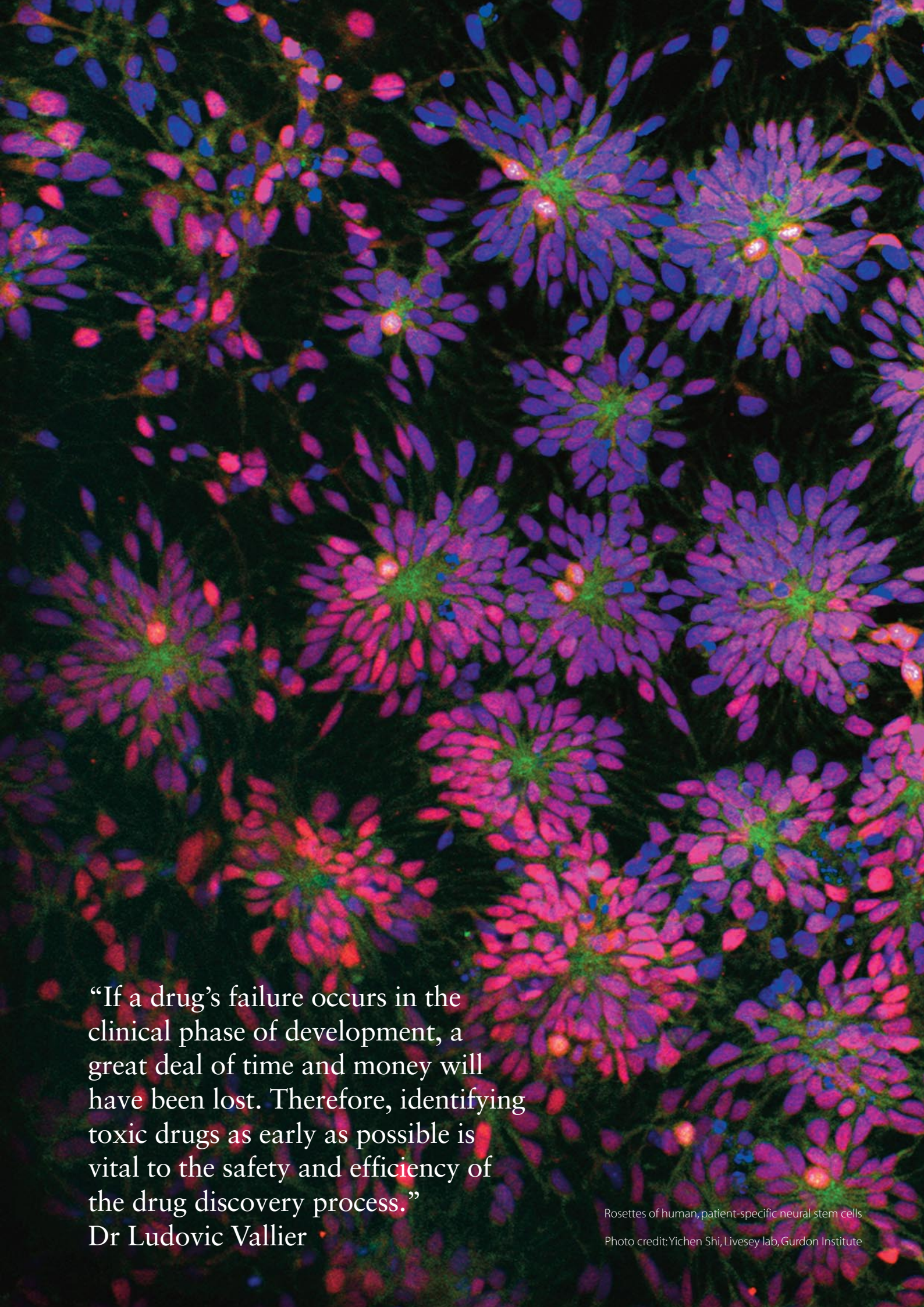
Dr Vallier led a team, including Dr Rashid, Dr Nick Hannan and Candy Cho, that developed the technology to generate human liver cells (hepatocytes) in a highly reproducible and scalable manner for commercial use. The technology has also been used to model a diverse range of inherited liver diseases and has the potential to accelerate the development of new therapies for these conditions.

The liver is the key organ for metabolising drugs and removing toxins from the body. Consequently, it is often affected by toxic compounds. Demonstrating that a new drug candidate is free from liver toxicity is a key test in the development process, and it is a test that most drug candidates fail.

"If a drug's failure occurs in the clinical phase of development, a great deal of time and money will have been lost," said Dr Vallier. "Therefore, identifying toxic drugs as early as possible is vital to the safety and efficiency of the drug discovery process."

The hIPSC-derived cells produced by DefiniGEN, show many of the functional characteristics of primary cells, are highly reproducible and can be made in large quantities, making them ideal for toxicity testing.

In addition, the company's OptiDIFF platform has produced libraries of disease-modelled cells for a range of diseases, including the most common inherited metabolic conditions such as Familial hypercholesterolemia and Alpha-1 antitrypsin disorder. The cells effectively demonstrate key pathologies of diseases and can be used to improve lead optimisation studies, assisting the development of new therapies for these conditions.



"If a drug's failure occurs in the clinical phase of development, a great deal of time and money will have been lost. Therefore, identifying toxic drugs as early as possible is vital to the safety and efficiency of the drug discovery process."
Dr Ludovic Vallier

Rosettes of human, patient-specific neural stem cells

Photo credit: Yichen Shi, Livesey lab, Gurdon Institute

Our courses are about enabling young people to flourish. We present a dilemma and give them the resources to try out various solutions for themselves – we never steer them toward a certain solution."
Dr Sara Savage

Challenging "us versus them"

The on-going financial crisis, the rise of right-wing populist and anti-immigration political parties, and the continuing sectarian conflicts across the world, all multiply the tensions associated with globalisation. Cambridge Enterprise is supporting a programme designed by University researchers to address these issues across various groups.

Under increasingly difficult conditions, people with widely differing viewpoints are compelled to rub shoulders – often uncomfortably – with each other. In doing so, what many groups experience is the feeling that their values and their identity are under threat, whether that threat is real or perceived.

Personal values are a primary motivating force, underpinning the way people think, behave and relate to the wider world. When individuals feel that their values or identity are under threat, they go into cognitive constriction, failing to see or even consider opposing points of view. This way of thinking becomes quite self-limiting, potentially leading to a clash with those who disagree, and can affect any group or belief system.

A series of original programmes to address the tensions of worldview clash has been designed by Dr Sara Savage and her colleagues from the Psychology and Religion Research Group in the University's Faculty of Divinity. The programmes use multimedia and role-play activities, to give participants the tools they need to see some worth in differing viewpoints while remaining true to their own values.

The aim of the courses is to promote social cohesion while respecting difference by promoting participants' Integrative Complexity (IC) – the ability to see value in differing viewpoints around a given issue, and to perceive a wider framework that can make sense of difference.

The first of these courses to be rolled out, Being Muslim Being British (BMBB), designed with Dr Jose Liht, serves as a primary prevention to build resilience in Muslim youth against the pull of radical groups and radical discourse that has been so prevalent online. The team has thoroughly tested seven pilot programmes around the country and is currently working with Ealing Borough Council in London to roll out BMBB in schools.

"These courses don't so much 'engineer' a change as remove obstacles to young people being able to think about the social world according to a wider array of their own values. By creating a safe context with the necessary resources, the obstacles disappear and people are free to think for themselves."

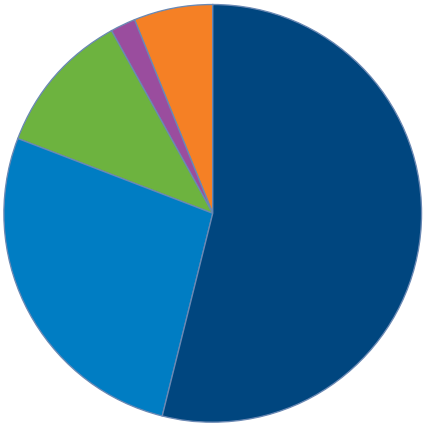
"Our courses are about enabling young people to flourish. We present a dilemma and give them the resources to try out various solutions for themselves – we never steer them toward a certain solution," says Dr Savage.

In addition to the BMBB programme, Dr Savage and colleague Anjum Khan are in the process of adapting BMBB for use in the Netherlands, Italy, Germany and Spain, addressing the way right-wing extremism interacts with Islamic extremism. Dr Eolene Boyd-MacMillan and Dr Savage have also received funding from the Scottish government for a programme to address sectarian issues between Catholic and Protestant groups in Scotland. All of these programmes are run through Cambridge Enterprise's Consultancy Services team.

Financial performance

Income from knowledge transfer activities is a key indicator of the value that Cambridge research has in the marketplace. Total group income from licensing, consultancy and equity transactions in 2011/12 was £9.1 million, of which £7.5 million was or will be distributed to academics, departments and others to recognise their contributions and to encourage their further participation in knowledge transfer.

Distribution of group income 2011/12

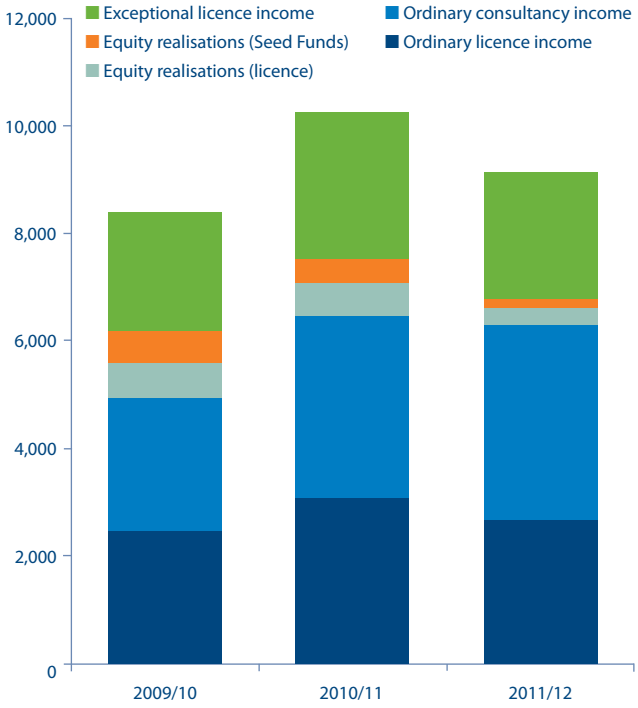


- Distributions to academics and others
- Distributions to departments
- Investment in patent assets and proof of concept
- Returned to Seed Funds
- Support for group

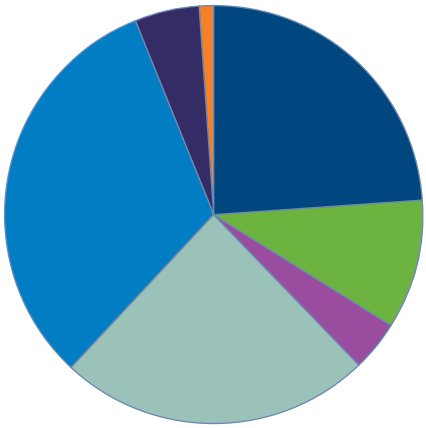
Income distribution by School 2011/12

- School of Arts and Humanities
- School of Biological Sciences
- School of Clinical Medicine
- School of Humanities & Social Sciences
- School of Physical Sciences
- School of Technology

Group income 2009/10 – 2011/12 (£'000)



Sources for 2011/12 operating costs (including investment in patent assets)



- Margin contribution from consultancy & licensing services – ordinary
- Margin contribution from consultancy & licensing services – exceptional
- Margin contribution from equity realisations
- Grant funding
- University funding for services
- Fund management fees
- Other income

Financial performance

Group income & expenditure summary

Year to 31 July 2012

	2011/12 £'000	2010/11 £'000	2009/10 £'000
Group income:			
Income generated from activities (ordinary)	6,292	6,465	4,953
Income generated from activities (exceptional)	2,358	2,711	2,207
Seed Fund and licence equity realisations *	476	1,044	1,213
University & HEIF funding	2,081	1,782	1,262
Fees for services	495	325	318
Other income	39	134	88
Total group income	**11,741**	**12,461**	**10,041**
Group costs, IP investments & distributions:			
Operating costs (staff costs, other costs & interest payable)	(2,908)	(2,655)	(2,589)
Investment in IP assets (patent & proof of concept)	(1,044)	(1,070)	(906)
Distributions to academics & others	(4,948)	(5,781)	(3,707)
Distributions to University *	(2,585)	(2,846)	(2,896)
Total group costs, investments & distributions	**(11,485)**	**(12,352)**	**(10,098)**
Net income/(expenditure) for the year	256	109	(57)

Group accounts

The group income & expenditure summary comprises consolidated results for Cambridge Enterprise Limited and its wholly owned subsidiary company, Cambridge University Technical Services Limited, presented in a management accounts format.

* Seed Fund and Licence Equity Realisations and Distributions to University Departments include an amount received on behalf of and returned to the University Evergreen Funds (University Venture Fund, University Challenge Fund & University Discovery Fund) for equity realisations in the year.

Cambridge Enterprise Limited charges an annual Seed Funds Management Fee to the University of Cambridge for the management of the University Evergreen Funds.

Equity managed by Cambridge Enterprise

	Total £'000
Investment valuations as at 31 July 2012	19,129
Investment valuations as at 31 July 2011	13,436
Equity realisations for the year to 31 July 2012	476

£4.9 million
returned to University researchers

£2.6 million
returned to University departments

£17.5 million
in translational funding won by researchers with the support of Cambridge Enterprise

Biotech

Ampika Innovative Pharmacy

astex pharmaceuticals

Avlar BioVentures Ltd 1

Avlar BioVentures Ltd 2

biotica

BlueGnome

Cambimmune Ltd

Cambivac

Cambridge EpiGenetix

Cambridge Microbial Technologies Ltd

CellCentric unlocking epigenetics

Chroma Therapeutics

De Novo Pharmaceuticals

Epsilon 3 Bio Ltd (was APOE Technologies Ltd)

expedeon Protein Solutions

FXT Funxional Therapeutics Inflammation Controlled

horizon precision genome editing

illumina

Lumora

Mission Therapeutics

oco

Sentinel Oncology

Sure Laboratories

Vivamer

Clean Tech

Breathing Buildings

Camfridge

Eight19

enecsys Micro Inverters

enval Value from Waste

GR²L Gas Recovery & Recycle Limited

Metalysis

Plastic Logic

Diagnostics

Arctic DX Inc.

Diagnostics for the Real World

PneumaCare

RainDance Technologies

smart holograms

UroSens

Industrial apps/clean tech

Cambridge CMOS Sensors

Cambridge Flow Solutions

Cambridge Mechatronics

CamSemi

Cambridge Superconductors Ltd

Fibrecore Developments Ltd

Granta Material Intelligence

Ionscope

Light Blue Optics

Paramata

polatis

Q-Flo Ltd

Surface Generation

TeraView

zinwave

Medtech

CAMBfix

Clinical & Biomedical Computing Ltd

Inotec AMD Ltd

Other healthcare

Microbial Technics Ltd

Other technology (including software)

Advex Corporation

Cambridge InnoVision Limited

CEDAR

iLexIR NLP Consultancy

InputDynamics

Missing Fundamentals Ltd

SoundID

Sphere Fluidics

The CRISP Consortium Ltd

Governance & structure

Cambridge Enterprise is a wholly owned subsidiary of the University of Cambridge.

Board of Directors

Chair

Edward Benthall

Non-Executive Directors

Charles Cotton	Cambridge Phenomenon Limited
Professor Sir Richard Friend *	Cavendish Professor of Physics
Professor Lynn Gladden	Pro-Vice-Chancellor (Research)
Dr Mike Lynch	Non-Executive Director
Professor Tony Minson *	Professor of Virology
Professor Florin Udrea	Professor of Semiconductor Engineering
Teri Willey *	Mount Sinai School of Medicine

Executive Directors

Dr Tony Raven	Cambridge Enterprise Limited
Dr Richard Jennings	Cambridge Enterprise Limited

Company Secretary

Registrary	University of Cambridge

Nominated Officer of the Shareholder

Director of Finance	University of Cambridge

Investment Committee

John Lee	Chair
Professor Gehan Amaratunga	1966 Professor of Engineering
Charles Cotton	Cambridge Phenomenon Limited
Laurence Garrett	Highland Capital Partners LLC
Dr Hermann Hauser	Amadeus Capital Partners Limited
Derek Jones	Babraham Bioscience Technologies Limited
Dr Henry Kressel	Warburg Pincus LLC
Professor Chris Lowe	Professor of Biotechnology
Sir Keith Peters	Emeritus Regius Professor of Physic

Management Team

Dr Tony Raven	Chief Executive
Dr Richard Jennings	Deputy Director
Boris Bouqueniaux	Head of Support Services
Dr Anne Dobrée	Head of Seed Funds
Dr Malcolm Grimshaw	Head of Physical Sciences
Shirley Jamieson	Head of Marketing
Mark Parsons	Head of Finance & Accounting
Dr Paul Seabright	Head of Consultancy Services
Dr Iain Thomas	Head of Life Sciences

*Until September 2012

Company Information

Cambridge Enterprise Limited

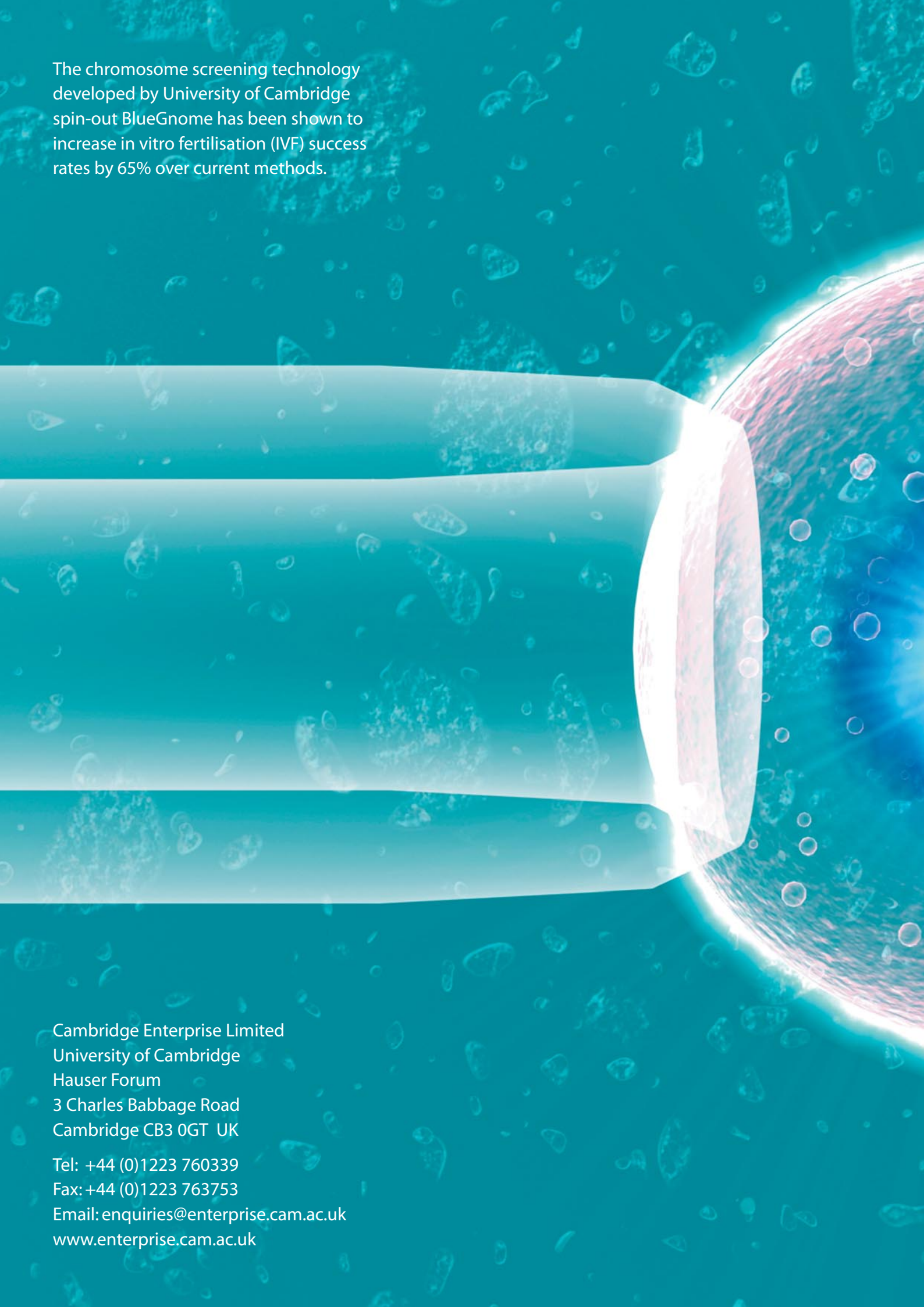
University of Cambridge
Hauser Forum, 3 Charles Babbage Road, Cambridge CB3 0GT

Company Number: 1069886
Registered in England and Wales.
Registered Office: The Old Schools, Trinity Lane, Cambridge CB2 1TN

Cambridge University Technical Services Limited

Company Number: 5749230
Registered in England and Wales.
Registered Office: The Old Schools, Trinity Lane, Cambridge CB2 1TS

The chromosome screening technology developed by University of Cambridge spin-out BlueGnome has been shown to increase in vitro fertilisation (IVF) success rates by 65% over current methods.



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