



Unleash your ingenuity

YOUNG ENTREPRENEURS SCHEME



Contact:

YOUNG ENTREPRENEURS SCHEME (YES)

Nottingham University Business School
Jubilee Campus
Nottingham
NG8 1BB

Telephone: +44 (0)115 951 5273

www.biotechnologyyes.co.uk / www.environmentyes.org

Celebrate ingenuity

Foreword

Celebrating two decades of innovation



Professor Jackie Hunter
BBSRC Chief Executive

In 2015, the Young Entrepreneurs Scheme (YES) reaches a number of remarkable milestones as it marks two decades in existence and its alumni surpasses 5,000.

At its core, YES is an innovative competition giving early career researchers from diverse backgrounds a practical insight into how to commercialise research and recognise the benefits of industrial collaboration, providing a springboard for their own career development into a multitude of sectors.

Through the close working of co-organisers at The University of Nottingham and the Research Councils over the past 20 years, YES has built very strong collaborations with industry, such as GSK, Unilever and Syngenta. At YES workshops held across the country, numerous professionals – from business and academia, working in small and large organisations – give up their time for free to speak, mentor and judge on our behalf.

I believe that the success and longevity of YES is the result of genuine partnership on many levels all aimed at the common goal of developing an entrepreneurial culture amongst researchers for the benefit of the UK economy.

The energy and enthusiasm of YES participants never fails to impress me and, on behalf of all organisers, I would like to send a heartfelt thank you to all those who have taken part and all those who have worked so hard over the years to sustain YES and make it the success it is today.

Jackie Hunter

Professor Jackie Hunter
BBSRC Chief Executive
December 2015



Still unleashing ingenuity 20 years on



Simon Mosey
Professor of
Entrepreneurship and
Innovation and Director
of the Haydn Green
Institute for Innovation
and Entrepreneurship

Meaningful acronyms are hard to come by, especially in universities and business, but the affirmative, 'can do' message of the YES programmes has succeeded in inspiring continuous action and entrepreneurship for 20 years.

Ten years ago, over 1,000 early career researchers had already taken part in YES competitions. Biotechnology YES had established itself in the sector, and strong partnerships had formed between The University of Nottingham's Haydn Green Institute for Innovation and Entrepreneurship and the BBSRC, as co-organisers and sponsors, the MRC and the vast majority of UK universities, leading companies and government agencies nationally and regionally.

Expansion into other academic disciplines ensued with Environment YES launched in 2005, co-organised with and sponsored by NERC. The wider reach of YES was further accelerated through wider industry partnerships: a bespoke competition was held for microbial and plant science, supported by the BBSRC and Syngenta at their Jealotts Hill research site in 2011. Here participants were tasked with addressing industry specific challenges using breakthrough science. Similarly, a competition for biomedical science was launched at the Bioscience Catalyst in Stevenage in 2012, together with GSK, the MRC and Wellcome Trust. Most recently, a food, health and wellbeing workshop was held this year supported by Unilever at their Colworth Park innovation facility.

The YES family has also expanded internationally and into different industry sectors. Teams from

the USA and India have participated with the support of the FCO, and the YES experience is now shared through Engineering YES, together with Loughborough University and the Rotary Club. The Royal Society of Chemistry now sponsors entrepreneurial chemists to participate and we offer Digital YES and Energy YES in partnership with the EPSRC and Alstom.

Today, over 5,000 researchers have collaborated and competed in teams and YES has made significant contributions to their skillsets, their outlook, career prospects and the impact their ideas are having in their sectors. Our alumni represent an inclusive mix: 52% women and 48% men. Original partnerships remain as strong as ever and new sponsors continue to join us.

Much more than a plan

So how does it work? YES is an innovative competition developed to raise awareness among early career researchers of how ideas from science and engineering can be commercialised. Delivered in partnership, funded by sponsorship and drawing on unparalleled expertise from industry and the research community, the competition aims to encourage an entrepreneurial culture that benefits the UK economy.

Teams of researchers united by a dedication to their subject, curiosity, enthusiasm and a desire to learn invest hours of preparation and intense work as they attempt to deploy novel science to address seemingly impossible challenges such as the ageing population, sustainable food production and global warming. In this way they develop a business plan for a start-up company based on a hypothetical but plausible idea during an intense three-day residential workshop.



The workshop is where the magic happens. It encompasses presentations and mentoring sessions from leading figures in industry who give their time and advice for free. It culminates in the presentation of business plans to a panel of 'equity investors'. These individuals come from industry and academia and have decades of experience and proven track records of professional success.

Life-changing experiences

For participants, the competition expands horizons and initiates changes in attitude and behaviour in a way many might never have experienced before.

"It kind of set a fuse off in my mind when I was in the first year of my PhD and realised I was interested in pursuing some kind of scientific career", said past participant Dr Robert Grundy, now a mentor, an advisor to the Northern Ireland Government on biotechnology, and Founder and Director of Anglezarke Life Sciences Ltd. "The business aspect of science really appealed to me, the dynamism in that application of science."

An impressive return on investment

For me and for the rest of the team who have organised, designed and delivered these competitions over many years, it's encouraging to see how past participants' careers progress and how positively they speak of the impact of the unique YES learning experience.

The programme is financially efficient and effective in how it develops entrepreneurial skills and raises the aspirations of young scientists. Every £1 of Research Council funding is matched by £2.89 from other sources¹. We estimate that

in the past 20 years YES has contributed to an economic impact through salaries alone of over £1.8 billion². Further additional benefits are widespread and ongoing.

For us, this longitudinal experiment delivers tangible results. For the researchers who take part and the speakers, mentors and judges who continue to give up their time to support the competition, it can lead to refreshing ideas and unprecedented opportunities.

As you shall see in the following pages, we are delighted to watch previous participants gaining senior positions within industry, the public sector and academe. This provides a virtuous circle as they return to the YES competition to pass on their knowledge and provide invaluable role models for today's early career researchers.

Professor Simon Mosey
Director, Haydn Green Institute for Innovation
and Entrepreneurship,
The University of Nottingham

1. Webb, D. (2010), "Evaluation of Biotechnology YES", DTZ. Available at <http://www.bbsrc.ac.uk/web/FILES/Reviews/1007-biotechnology-yes-review.pdf>

2. Adapted from Webb, D. (2010), "Evaluation of Biotechnology YES" and a YES Linked In group survey conducted in October 2015.

Supporting the highest quality research worldwide

YES 1997



Dr Alicia Greated
Director of Research and Enterprise, Heriot-Watt University



Alicia Greated is heading back to Scotland for her new role at Heriot-Watt University, representing its portfolio of excellent research. This latest move from Swindon's nexus of government research offices to Edinburgh is by no means the farthest she has travelled to promote and develop research excellence, enterprise and innovation on behalf of Britain. In the past seven years Alicia has set up the RCUK's office in India, run its China office and led programme delivery of international science and innovation partnerships for the UK's flagship £375m Newton Fund.

Teamwork and autonomy

During one of the first Biotechnology YES competitions, in 1997, Alicia found values and themes aligned with her own. "Sometimes in the work environment there can be an emphasis on individualism and competition. I feel I'm a natural collaborator, and this was a major theme during YES."

She has always believed strongly in taking action to make a difference in the world. While studying biochemistry at Glasgow University, Alicia got involved in conservation work. During holidays she travelled and worked, teaching in Kenya and, later, English in China, and working in a lab in Brazil.

"People underestimate the value of extracurricular activities," she says. While writing up her PhD research in molecular genetics at Birmingham, she also trained to be a fitness instructor and taught salsa dancing. "When I did YES, I was in a great lab but mainly focused on just achieving my PhD. YES helped show the importance of leadership, autonomy and collaboration."

Be confident about what you value

It was a contact from Biotechnology YES who recommended Alicia's "first real job". "Someone from the YES team said: 'You'd love this', so I applied to join the EPSRC." A while later, encouraged to apply for a big promotion, she became Head of Engineering, managing 20 people and a £100m budget. "That was really scary, that sudden autonomy."

Alicia became Associate Director, Research, for the AHRC, in 2007. "You should always feel a little apprehensive," she says, "but it's really important to know what you value. Challenge yourself so you're a bit out of your depth and create a strategy that's achieving something really significant."

Leading research collaborations

In 2008 Alicia took on the challenge of establishing the Research Councils UK (RCUK) office in India. As Director of RCUK India she recruited a new team and developed research collaborations with Indian universities and industry. "It was the most exciting opportunity," she says, "all about thinking about what you can achieve rather than what's difficult, having a clear strategy and vision, nurturing good relationships, and focusing on excellence."

After nearly four years there, she moved to Beijing to be Director of Research Councils UK, China, establishing closer cooperation with the Chinese Ministry of Science and Technology (MOST) and overseeing RCUK-funded joint research.

She returned to the UK in 2014 to become Head of the Newton Programme Management Team at the Department for Business, Innovation and Skills.



“YES definitely raised my awareness of enterprise and entrepreneurship. It was also one of my first chances to practise presentation skills. Now I can happily present to hundreds of people.”

Top impacts

Global research excellence

Alicia has championed collaborative research and innovation in senior roles at major UK funding bodies and now a top Scottish university. The Newton Fund's focusing of international aid to strengthen science and innovation capacity has helped unlock funding to support poverty alleviation through 15 UK delivery partners in collaboration with 15 partner countries.

Building relationships

Between the public and private sector, from engineering and the physical sciences to the arts and humanities, and in India, China and a host of developing countries including 4 Latin American

states and 5 South-East Asian countries, Alicia created and nurtured strong, mutually beneficial collaborative research relationships.

Collaboration and impact

The Newton Fund is the model for other partnership funding programmes that leverage the power of partnerships using aid funding and matched income from public and private sector sources to generate meaningful impact.

Research and Enterprise at Heriot-Watt: <http://www.hw.ac.uk/services/research-enterprise.htm>

Personalised chemotherapy using high-content screening

YES 1999



Dr Rod Benson
Chief Operations
Officer, Imagen
Biotech



"I was always more attracted to applied science than academic work," says Rod Benson. After gaining an undergraduate degree in physiology and biochemistry from the University of Sydney, Rod then spent a few years in computer programming before moving to Britain. While a research assistant at a University of Manchester lab he started a PhD in physiology and cell biology (1993-96) followed by "a couple of post-docs".

In 1999, during his second post-doc, the chance to do Biotechnology YES came up. "YES is great. I learnt the principles of cash-flow projection and other useful stuff. The cool thing about our team was we all had a good sense of humour so we worked through the night having a great time."

A van-load of lab equipment

After YES, Rod won Showcase funding from the Wellcome Trust and registered a patent. He then left academia to work for AstraZeneca, as did Biotechnology YES teammate Dr Gareth Griffiths soon after. When the recession bit in 2007 that company restructured, began to outsource services,

and jobs were cut. Rod saw an opportunity and negotiated from former employer AstraZeneca, as part of his redundancy package, a donation of no-longer-needed lab equipment. It turned out to be their first major investment. He and Gareth formed Imagen Biotech. At first they provided lab services to their former employer and others, but as the recession worsened they had to innovate.

Applying 'big-pharma' lab techniques

One client-commissioned study measured cell death in primary patient tissue. Rod and Gareth realised this approach might help personalize chemotherapy treatment by letting oncologists select the most potent, effective drug for each individual patient. In 2013, under new CEO Dr Jonathan Engler, Imagen Biotech secured just over £1m to pilot High Content Screening (HCS) to determine if testing many standard cancer therapies using high-throughput HCS on primary patient samples would improve cancer therapy. An initial pilot study in ovarian cancer gave encouraging results and a further £1.2m investment is allowing them to expand research into other difficult-to-treat cancers.

Top impacts

Innovation

Imagen Biotech's HCS and data analysis measures cell death directly, not a surrogate marker of cell count. Imagen also patented specific media and developed proprietary software which builds highly ordered workbooks so clinicians can determine which drugs performed best in the assay.

Supporting Biotechnology YES

Rod speaks at Biotechnology YES every year. "I say 'If you think this is tough, wait until you experience the reality of a start-up.' You must really believe in what you're doing."

Visit Imagen Biotech at
<http://imagen-biotech.com>

Protecting bioscience ingenuity

YES 2000



Dr Richard Gibbs
Partner and Chartered
Patent Attorney,
Marks & Clerk



"I get to see some of the most cutting edge technology around: everything from a new cancer drug to a widget that improves prosthetic limbs. I also get exposed to more science than I did at university."

Richard Gibbs specialises in biotechnology as a Chartered Patent Attorney and Partner at the Glasgow office of Marks & Clerk. "I'm a true scientist at heart," he says, "but I've always wanted to apply it." After his first degree in medical microbiology at Edinburgh University, Richard worked in a lab for a year supporting a project whose results were important to a patent application. He started to appreciate IP and pursued a PhD in medical immunology.

IP was the thing for me

Richard took part in Biotechnology YES in 2000. "I saw an advert on a noticeboard and decided this would be fun and interesting – a way to get away from the lab for a few days and learn what was out there. So we got a team together. The first day was superb and intense: the single biggest concentration of information we'd ever

had. Then we got to put it into practice." They finished on a high, winning the Scottish round. Afterwards Richard flirted with the idea of entrepreneurship. "The thing is, I'm risk averse. To be an entrepreneur, you've got to be willing to chuck everything at it."

After his doctorate he lectured for a year then applied for intellectual property roles. "For me, one of the biggest challenges was getting into the profession. It wasn't easy then and it isn't now. YES gave me added confidence."

Continuing support for YES

Richard joined the firm in 2003 and studied to qualify as a patent attorney. He has worked with all major Scottish universities and speaks regularly at IP conferences and events, including Biotechnology YES in Scotland. "I've been involved pretty much constantly in YES in one form or another since I did the competition," he says. "I deliver the initial IP talk on the first day of the Scottish session and I've been a judge as well. There's great consistency, because of The University of Nottingham and Tracey. They believe in it; they're passionate about it."

Top impacts

Intellectual property

Richard has worked with thousands of innovators to protect their IP and help their ideas take off.

Spotting potential talent

One benefit of our continued involvement in YES is exposure to bright students. It's an excellent source of talented individuals and now a regular welcome feature on CVs when people come to interview.

The value investors look for

Key to any business is a solid IP portfolio. Making sure you've protected not only your main product and brand but all of the company's IP interests, safeguards the value investors look for. It's one of the first things you need to think about before you invest in other activities.

Find out more about Marks & Clerk at
www.marks-clerk.com

Translating medical research to benefit health

YES 2002



Dr Ranmali Nawaratne
Senior Business
Manager, Translation
Team, The Francis Crick
Institute



The word 'translation' has many meanings. For Ranmali Nawaratne, it's about working with researchers and other stakeholders to drive fundamental scientific discoveries towards improvements in human health. She recalls her interest as a teenager in applying biotechnology to benefit others: "I was quite interested in plants and loved the idea of helping people in famine-hit parts of the world by growing crops there modified to be more resilient."

After a decade in technology transfer at Medical Research Council Technology (MRCT), Ranmali has been seconded to the Francis Crick Institute to assist in the set-up and delivery of its translation strategy. "I'm very excited to be helping The Crick deliver its vision for translation," she says. "It's a really good thing that research translation is high on the strategic agenda in the UK and that the concept is becoming embedded in scientists' consciousness."

From biology to biomedicine

Ranmali's first degree, in biochemistry with biotechnology at Royal Holloway University of London, included industrial training at Unilever. Then she was offered a funded PhD position but turned it down. "I decided I wanted to learn more techniques and medical applications so enrolled on a lab-based masters in biochemical research at Imperial College." This was followed by PhD research at Cambridge into the molecular mechanism of insulin resistance.

Building a team for YES

"Part of me has always been quite practical," she says, "I realised during my PhD I wanted a

job in technology transfer since it focuses on the applications of science. Cambridge encourages entrepreneurship and offers students many relevant courses and societies. It was great to be there."

One day, during the second year of her PhD research she saw Biotechnology YES advertised. "None of my friends at that point had done YES, but I was keen to go, so I pestered people in my lab until three others joined me."

They did some preparation beforehand but Ranmali says: "We were probably terrible. We struggled at first and got bogged down in the detail; then we had the idea of not focusing on our PhD research but instead basing our hypothetical business on something completely different – genetically modifying cut flowers using proteins from arctic jellyfish to withstand being grown in colder temperatures – thus reducing waste in the supply chain." She remembers it vividly as a "full-on" experience and "quite scary" but she felt "invigorated". Ranmali has mentored YES participants several times since.

Developing with MRCT

Ranmali joined MRCT in early 2005 and is part of the Technology Transfer Division. She has managed IP for a number of Medical Research Council units, has tracked IP for smaller medical research charities and has been the IP contact on drug discovery project teams from MRCT's Centre for Therapeutics Discovery. "I feel lucky to have been part of MRCT – it has grown hugely over the last ten years with an evolving strategy, allowing scope for continued learning and different experiences."



Top impacts

Fuelling advances in healthcare

Ranmali has worked with many researchers and labs to help ensure innovative life science research reaches its full potential.

Knowledge and responsibilities

In the past decade she has gained expertise in due diligence, IP protection, patent management, IP development via proof-of-concept funding, marketing, commercialisation, project management, and translation strategies.

Measuring impact

She appreciates how diverse bioscience research is, the importance of foundational research and the many ways of measuring success, and how vital it is to choose the right approaches to evaluation.

Find out about MRCT:

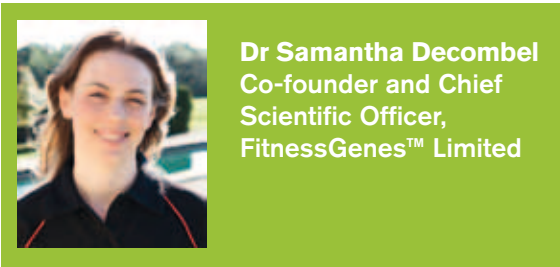
<http://www.mrcttechnology.org>

Visit The Crick:

<https://www.crick.ac.uk/>

Helping people to achieve their fitness goals

YES 2003



Dr Samantha Decombel
Co-founder and Chief
Scientific Officer,
FitnessGenes™ Limited



FitnessGenes™ helps people achieve their goals by developing personalised training and fitness plans based on genetic evaluation. For her doctorate from the University of Birmingham Sam studied gene flow between wild and cultivated species of rice. She took part in Biotechnology YES during her PhD.

Sam’s path to entrepreneurship

Armed with the experience of taking part in YES, Sam first worked as Technology Transfer Manager at the University of Reading.

“It was actually YES that got me into the idea of technology transfer,” she says. “I didn’t know what I wanted to do when I graduated and then I did YES. It clicked with me because I love science and I really wanted to use my scientific knowledge in work and in doing that, help people commercialise science and get it out to the public where it’s going to be of benefit to people.”

After learning to identify and commercialise IP, Sam combined her academic background in genetics with these new skills to co-found PlayDNA™ with her partner, Stuart, in 2010. This unique business producing bespoke artwork based on a customer’s DNA appeared on the BBC’s *Dragons’ Den*. It was a crucial stepping stone to their main venture, FitnessGenes Ltd.

The inspiration for FitnessGenes

A chance conversation between Sam, Stuart and their friend Dr Dan Reardon sparked another idea in 2013. Dan was a medic working in A&E whose interest in fitness and body building had led to him answering queries online related to training and diet. On hearing about PlayDNA™ and genetic profiling, Dan told Sam and Stuart

that DNA profiling would be of great interest to his client base, helping them form the best way to eat and train.

All three decided to combine their expertise and create a business. Nutritionist Mark Gilbert came on board and using the platform developed for PlayDNA™, MuscleGenes™ (its original name) was born.

Among Dan’s existing client base, demand for the service was initially so high that the team had to take it off sale after two weeks as they couldn’t keep up with processing orders. “That’s when we realised the real potential of it,” says Sam, “and we thought ‘okay, we’ll do this properly and we’ll raise some money to actually build a platform to get the systems in place and build the technology that’s required to actually manage the product.’”

Two years on, MuscleGenes™ is now a sub-brand focusing on the core audience of body builders with FitnessGenes™ appealing to a wider audience.

The YES turning point

Sam credits YES as the thing that “inspired me to do tech transfer and gave me the skills which I later went on to use when starting my own business”. She says: “I could go so far as to say that without YES, I might not have started my own business. I really do see it as kind of a turning point for me.”

Sam has been back to the YES workshops as both a mentor and a judge. “I would absolutely recommend YES. It opens your eyes to other opportunities outside academia or industry.”



“ I really do see it as kind of a turning point for me in my thought processes of what I wanted to go on and do. And it was great fun! I love going back and hearing all the ideas and sitting down and discussing it with the groups. It’s a really fun experience.”

Top impacts

Novel IP

Sam, Dan, Stuart and the team at FitnessGenes™ have developed valuable processes, products, services and branding. Sam’s background ensures they assert all rights to this intellectual property.

Funding raised to date

In October 2015 FitnessGenes™ won £228k of Smart Scheme funding from Innovate UK, the UK’s innovation agency, bringing total investment raised so far to £1M.

Job creation and growth

Currently a team of 15, the business is continuing to recruit and grow.

Collaboration and impact

Academic partners include the University of Birmingham and Loughborough University.

Its new Smart Scheme funding will let FitnessGenes™ and Prof Jean-Baptiste Cazier, Director of the new Centre for Computational Biology at the University of Birmingham, apply bioinformatics expertise to analyse genetic and lifestyle data, producing scientifically designed, personalised, actionable recommendations to help people achieve health and fitness goals rapidly.

Visit FitnessGenes™ at <https://fitnessgenes.com>

Helping businesses to access ideas

YES 2003



Dr Vittoria Danino
Relationship
Manager, Science and
Biomedical Science,
University of East
Anglia



"Part of the reason I wanted to do science in the first place is that it changes stuff – I wanted to see research used," says Vittoria Danino, Relationship Manager (Science) at the University of East Anglia. "I work with our researchers helping manage relationships with businesses, industry, government and NGOs to ensure our work has benefits." This includes the Marine Knowledge Exchange Network (MKEN) which promotes the full range of UEA marine expertise rather than one group or research project. "In my role I make sure projects progress, identify companies, network, and manage some impact funding streams."

Choosing science

"No one in my family had been to university, so it wasn't easy to know what decisions to make." Despite this, and determined to pursue her interest in science, Vittoria applied to Edinburgh to study microbiology, then moved to the John Innes Centre to research quorum sensing in nitrogen-fixing rhizobia for her PhD followed by a post-doc at the Institute of Food Research in Norwich from 2002-2009.

Risks and opportunities

Vittoria took part in Biotechnology YES in 2003 after a period of uncertainty during an industry-funded post-doc. "The company paid per experiment and I did a lot of experiments, so it brought in income for the lab; but I also experienced the hard end of industry-funded research." Two months before it was due to be completed, the company pulled all R&D funding. "Post-docs are uncertain and there's a lot of luck involved in science. YES helped researchers like me understand and de-risk the business world, and appreciate some risk is necessary."

Vital science communication

Vittoria has volunteered with SAW (the Science, Art and Writing project), completed a part-time postgrad diploma in science communication at Birkbeck, and worked at science summer schools. "I was at the John Innes Centre just after the GM debate in the 1990s. It had a massive influence on our industry caused by people misunderstanding science. It made me realise that if people are scared of a new biotechnology, they're not going to want to use it."

Top impacts

Understanding business

To add to her experience as a researcher, science communicator and relationship manager, Vittoria has just completed an MBA – with distinction – after studying part-time at Norwich Business School.

Promoting YES

One of my colleagues was on the same Biotechnology YES team as me. We were first people at the Institute of Food Research to do Biotechnology YES. These

days it's much more a 'standard' thing to do and we support UEA's teams. We promote it within the professional development programme for research students and I present to them. This year, one set out to win and got to the final, the other team didn't. We're there to help them whether they want to win or just take part to learn.

Business at UEA <https://www.uea.ac.uk/business> and **MKEN** <http://www.meetup.com/marineken/>

Optical imaging 'smart agents' for real-time diagnosis

YES 2008



Dr Kev Dhaliwal
Founder, Edinburgh
Molecular Imaging



"When we took the concept of an optical light-detecting cancer patch to Biotechnology YES in 2008, we came second in the UK Finals – and the idea we presented there is a central part of what Edinburgh Molecular Imaging now does."

Dr Kev Dhaliwal is a busy man. Officially, 50% of his time is spent as a hospital doctor, a consultant in respiratory medicine in the NHS, and 50% is as a Senior Clinical Lecturer at Edinburgh University running a research group developing new optical imaging technologies funded by RCUK and medical charities.

The 'other 50%', he says half-jokingly is contracted to the company he co-founded to commercialise the technologies he and his research colleagues develop. "In reality," he says, "each element is driven by the others and forms part of one ecosystem." The hospital and research institute are located right next to innovators based in the Edinburgh Bioquarter, so Kev can also move freely between his clinical, research and company duties.

Seeing the light

After A levels Kev went to Edinburgh University to study medicine. During his training, he did a PhD funded by an MRC Training Fellowship. He was doing some basic research into diagnostic imaging – and it wasn't working. "Then I met an amazing chemist and friend and thought about how to use his skills with mine. We worked out how to apply smart chemistries (fluorescence) to finding new solutions. Seeing things happen in those first models made me visualise as a clinician what could happen in patients and how it might help them." I literally saw the light.

Further insights into clinical applications and commercial potential came via Kev's team's experiences during Biotechnology YES. "I'd never had business training before, so doing YES, learning about the spin-out process and simulating being part of company were all good practice. Not many clinicians get exposed to Biotechnology YES. Yet, experiences like this can bring clinicians much closer to their goals, in terms of developing and commercialising technologies so they can benefit patients."

Top impacts

Novel IP

The fluorescent agents developed by Edinburgh Molecular Imaging are novel and protected by patents in all major territories. The core of the technology is that the fluorescent signal from the optical agents is increased on target engagement in a diseased patient.

Funding

Raising funds for the start-up was "probably the most difficult thing I've

ever done," says Kev. "There were lots of knockbacks and refusals. It took over 3 years and dozens of pitches." The University team led by Professor Mark Bradley, Professor Chris Haslett and Kev have received just over £20m of funding from the Wellcome Trust, EPSRC and MRC, and Series A venture capital funding for EMI was £4m.

To find out more about EM Imaging, visit <http://www.edinimage.com/>

Showing how seaweed can combat obesity

YES 2008



Dr Matt Wilcox
Research Associate in
Alginates,
Newcastle University



Alginates (better known as seaweed to many of us) are having big impacts on the marine economy, aquaculture and agriculture, and also on healthcare. Dr Matt Wilcox, who took part in Biotechnology YES in 2008, is part of a group of scientists at the forefront of exploring which properties of alginates can be beneficial in our food.

Proof-of-concept opportunity

Following a first degree in biotechnology from the University of Northumbria, Matt started his PhD research at Newcastle University into 'bioactive alginates'. He was fortunate to have two supervisors both of whom had industry experience. One had worked with a pharmaceuticals company on using protective effects of alginates in a common remedy that helps treat acid reflux and aspiration. With his other supervisor he began research to answer the question "What else can alginates do to other digestive enzymes?"

Effects on lipase began to suggest alginates in food could have a useful role in how the body digests and expels fat. During the second year of his PhD research, Matt took the opportunity to "cobble together a claim and use an analogous approach" to take to Biotechnology YES where he learnt a huge amount in a short space of time.

Matt's team got through the regional heat and won a prize for Best Protection of IP at that year's Final. "YES helps you look at your own research in another light."

Proving claims for commercialisation

With the information he had learned during the YES competition about patents and other forms of IP protection, as well as looking at the patent landscape and doing basic market research, Matt was able to further develop commercial ideas based on his research and to interact with the University's Technology Transfer Office, which – until that point – he didn't even know existed.

European regulations have made it tougher to claim health benefits for alginates without very specific, verified and approved research findings for the right populations. Matt needed to secure additional finance for more research. A BBSRC CASE Studentship covered most of his PhD, and Matt applied for a BBSRC Enterprise Fellowship to cover the rest. One assessor happened to have been a Biotechnology YES judge.

The BBSRC has been tremendously supportive of Matt's work, and confidence and skills gained through YES have helped him pitch for funding provided by serial entrepreneurs as well as RCUK Business Plan Competition funding and commercialisation grants. "We very nearly span out, but now multinational companies are about to invest in a licensing deal with us."



Top impacts

Innovation

Matt convinced Newcastle University this was an idea with commercial potential. The Technology Transfer Office is helping apply for patents worldwide, with one granted already in New Zealand. They've already also made wonderful bread using their alginate ingredient.

Further human trials are planned in collaboration with industry which will help demonstrate how, combined with reduced fat intake and exercise, using alginates as ingredients could help make us healthier.

Benefits to health and society

Around 95-100% of all fat in our diets is digested and absorbed into our bodies. The research Matt and colleagues do shows that alginates in food can interact with enzymes that digest fat and get rid of it so less is stored by the body.

Funding and licensing

A new licensing deal will take the research closer to commercialisation with more human trials.

Read more about Matt's research here
<https://blogs.ncl.ac.uk/icamblog/skinny-seaweed/>

Rationally engineering biology to improve life

YES 2009



Dr Tom Ellis
Head, Tom Ellis Lab,
Imperial College,
London



The Tom Ellis Lab at Imperial College is part of the world's largest synthetic biology project, an international collaboration to redesign, rewrite and assemble a synthetic version of the yeast genome to create Yeast 2.0.

"The beauty of synthetic biology is that the DNA designs go into machines (cells) that are self-replicating and we can get product from them," says Tom. "We're very adept with yeast as an organism because of thousands of years of baking and brewing. Imagine a future where microbreweries from the UK to Africa to outer space could be reprogrammed with DNA printers attached to them so you could email them the sequences to produce medicines that are needed, when and where they're needed."

Tom oversees PhD and post-doc projects, manages collaborations with over 20 universities worldwide, works on joint projects with industry, presents at conferences and symposia – including the World Economic Forum in 2015 – and also teaches. His lab exemplifies entrepreneurial, interdisciplinary scientific research.

Creating structures and foundations

After a Masters in Biochemistry from Oxford and a PhD in molecular biology at Cambridge, Tom worked in a biotech firm for two years then went to Boston University for a post-doc before returning to Cambridge, where he was when he took part in Biotechnology YES in 2009. "Biotechnology YES gives you chance to come up with and plot an idea, then pitch it," says Tom. "Most of the time in science people are doing their project and don't get the opportunity to ask 'What if?'" He enjoyed the opportunity to break from research and explore how an idea might be commercialised.

Now come up with a crazy thing

In 2010, Tom joined Imperial College, setting up and securing funding for his own synthetic biology research group. "We're interested in building foundational tools to design a genome from scratch." He also teaches his own students to value putting ideas together and doing innovation. "What's scary is that almost from age 18 onwards you just learn and no one says 'now come up with a crazy thing'. That applied creativity is useful even if you're continuing in academic research."

Top impacts

Foundational research

Members of Tom's lab create synthetic yeast chromosome XI ('Yeast 2.0'), quantify cloning limits, work out new DNA assembly methods and strategies, tackle thermostability, engineer advanced materials from bacteria, and build modular regulation systems for yeast that enable complex logic circuits such as memory systems and pattern formation programs.

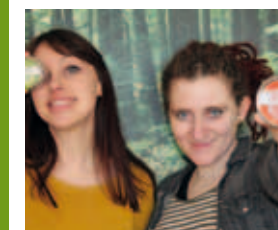
Redesigning life itself

There is no project more ambitious than rewriting how living organisms develop and multiply. Synthetic biology applies engineering concepts and methods to improve the speed, scale and precision with which we can engineer these biological systems.

Find out more at <http://tomellislab.com>

Growing wild flowers for conservation

YES 2010



**Dr Ana Attlee and
Dr Emily Lambert**
Co-founders,
Seedball



Ana Attlee and Emily Lambert met as scientists at the University of Aberdeen researching, respectively, conservation and systems biology. Both shared an interest in turning their scholarship into practical action through enterprise to contribute to helping the environment.

An ad for Environment YES caught their eye and they took part in 2010. The experience gave them new skills, insights and the confidence to begin developing a new business.

Japanese inspiration

They began the process of designing and manufacturing a wildflower gardening product that would help to improve habitats for pollinators, since people often overlook the impact that domestic gardens, window boxes and patio pots can have in helping wildlife. The result was Seedball, a fertile sphere containing a mini-ecosystem.

The idea germinated after Ana read about work by Japanese agronomist and monk, Masanobu Fukuoka, who revived the ancient technique of

seed propagation where compost, clay and seed are mixed into marble sized balls and scattered to grow crops more efficiently.

Ana and Emily loved this concept and could see its permacultural benefits over conventional approaches, so they went about adapting the recipe to suit wildflower seed, adding chilli powder into the mix to further protect seed from ants and seedlings from slugs.

Message in a Seedball

By 2012, using homemade packaging containing their first seed ball prototypes, they began selling at fairs and festivals. By the end of that year, Seedball had grown a large social media following, were stocked by their first shop and had made enough money to employ a design team to give the Seedball brand a makeover. In 2013 Seedball was launched officially.

Seedball is driven by social and environmental purpose, so all profits from sales are invested in social enterprise Project Maya. Part of its aim is to help other scientists embed impact in their work.

Top impacts

Innovation

Although based on an ancient Japanese idea, Emily and Ana added a hot twist to their Seedballs – a pinch of chilli powder to deter garden predators.

Retail reach

Seedball is now stocked by over 150 retailers in Britain and across mainland Europe, including Denmark, France, Germany, Italy, Netherlands, Sweden, and Switzerland. Its sales thrive online.

Environmental benefits

Seedball ingredients are natural and peat-free. Even the tins are manufactured locally using renewable energy – and they're reusable and highly recyclable. All profits are used to fund Project Maya and its work towards establishing global reserves worldwide.

Visit Seedball at www.seedball.co.uk and Project Maya at www.mayaproject.org

Single-use nanofibre purification

YES 2012



Dr Iwan Roberts
Co-founder and
Chief Operating Officer,
Puridify



The global fight against disease requires far greater efficiency in biomolecule manufacturing. Puridify is developing safe and cost-effective bioprocessing platforms using nanofibres to improve current purification technologies and meet market demand for cheaper biotherapeutics.

Applying bioscience discoveries

Iwan learnt about translating bioscience discoveries during his four-year MEng degree in biochemical engineering at UCL. He won academic prizes, but graduate employment prospects in 2008 started to look grim because of the recession. Iwan stayed at UCL, pursued an MRes before starting his EngD and took advantage of opportunities on offer including Biotechnology YES.

As a postgraduate, he was able to take modules in New Venture Development and Managing the Growing Business at London Business School thanks to an arrangement with UCL. Other experience included a three-month Fellowship in the Parliamentary Office of Science and

Technology (POST) and four months as an intern with IMS Consultancy Group working on a novel drug launch for a pharmaceuticals company.

YES applied knowledge

Biotechnology YES in 2012 condensed and applied what he'd learned. Iwan's team won the Manchester heat and went to the Final. "It was good to make new connections," he says. "Some judges' faces came up again when we went for funding." He continues to support Biomedical YES. "Lots of world-renowned academics and entrepreneurs devote their time for free. It's only fair to pay this forward."

Iwan and a fellow UCL EngD researcher spun out Puridify in 2013 backed by UCL and an Innovate UK Proof of Concept Bid to Smart Award. They won the SR One funded OneStart Competition in 2014 – £100,000 plus lab space in the Stevenage Bioscience Catalyst, backed by BIS, GlaxoSmithKline, the Wellcome Trust and Innovate UK – and, in 2015, an EPSRC and BBSRC Innovate UK Industrial Biotechnology Catalyst Project award.

Top impacts

Innovation

Dr Inga Deakin, Associate, Healthcare Ventures, at Imperial Innovations, recently said: "Puridify is well on the way to demonstrating the potential for its nanofibre technology to make a significant impact in biologics manufacturing."

Funding and investment

Securing £2.2 million of Series A follow-on investment by existing

investors Imperial Innovations, SR One and UCL Business in October 2015 brings the total raised so far, including grant funding, to £8 million.

Job creation

The number of Puridify staff has tripled in size in the past year.

Find out more about Puridify at <http://puridify.com>

Increasing the renewable energy that comes ashore

YES 2014



Andrew Jenkins
Founder, Kinewell
Energy Ltd



Offshore wind farms must harness energy and transport it to the mainland as efficiently as possible to justify their huge set-up costs and compete with conventional power generation. Yet planning exactly how to configure every component to best effect is complex and costly. Entrepreneurial engineer Andrew Jenkins has developed a business solution that promises to save developers time and money and also conserve energy. On land, the electrical Grid needs to become smarter as well, which is the topic of Andrew's PhD research.

Smart power

"Traditionally, we've had a few very large centralised power stations that supply power by matching demand across the UK," says Andrew. "With a move towards intermittent renewables located closer to the load, we're starting to need more localised balancing of supply and demand, utilising flexible loads and energy storage." So researchers like Andrew are developing control algorithms for flexible loads, such as electric vehicles, to create new 'smart micro-grids'. His consultancy finds other efficiencies out at sea.

Intelligent planning and design

After his engineering degree in new and renewable energy at Durham University, Andrew spent three years with a multinational consultancy and developed a business idea in his spare time. When his electrical engineering supervisor from Durham moved to Newcastle University, Andrew joined the research group but kept refining his own business idea as well. Environment YES in 2014 showed him that "your product doesn't have to be perfect, just better than what's there at the moment." It also taught how to price services and how VC investors calculate equity valuations.

Kinewell Energy's service uses clever software Andrew developed to design geographical electrical connections between offshore wind turbines using less cable, with reduced electrical loss. "I've created software to do design work better and faster than humans. It takes into account the cost of cable, electrical losses during operation, sea bed conditions and no-go areas – too many variables for a human to visualise," he says.

Top impacts

Faster software

Kinewell Energy was incorporated in 2013. After 2 years of R&D including redeveloping his software so it's 310,000 times faster and returning substantially superior design quality – Andrew has launched the service for clients.

Big potential savings

At sea, several hundred wind turbines each separated by around 1km connect in strings

to an offshore substation, collecting power before sending it to shore. This can require several hundred kilometres of cable, which costs upwards of £600 per metre. If you can connect turbines up using less cable and energy loss during operation, you save a lot of money – in the region of £100m to £1bn for the sector.

Visit Kinewell Energy at: <http://www.kinewell.co.uk/>

How YES benefits skills, the economy, research and business

An at-a-glance overview of our impact

