2018
INNOVATOR OF THE YEAR
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As we celebrate the 10th year of the Innovator of the Year awards, we have a perfect opportunity to reflect on the importance of innovation and its impact on our economy, communities and everyday lives. Over the years, the awards have seen many fantastic projects, each with their own unique story: from surprise discoveries arising from curiosity-inspired research, to innovations perfected through years of challenge-led work. They have had an impressive range of impacts, whether it’s making waves in global business, tackling disease or changing the way that the world does bioscience. They are merely a snapshot of the impacts that UK bioscience has every day, and highlight the importance of supporting and celebrating innovative research.

As well as looking back, it is also a great time to look forward. This year, BBSRC is proud to celebrate Innovator of the Year as a part of UK Research and Innovation. In coming together with the other research councils, Innovate UK and Research England, we hope to create the best-possible environment for the UK’s excellent research to thrive, and help researchers to maximise the impact of their work. I’m confident that, together, we can look forward to another ten years of success stories.

This year, we add to the legacy of the Innovator of Year awards by celebrating the fantastic work of 12 new finalists. It is not always easy to turn research into impact, but thanks to their dedication, vision and hard work, these teams are realising the full potential of their work and making a tangible difference. I hope you will join me in congratulating them.

Welcome to
Innovator of the Year 2018

Professor Melanie Welham
BBSRC Executive Chair
INNOVATOR OF THE YEAR

This competition recognises the important impact bioscience research and innovation has on lives, society and the economy. It celebrates the individuals and small teams who have harnessed the potential of their excellent research to significantly address real world challenges. It recognises the impacts arising from research BBSRC has invested in.

There are 12 finalists who have been shortlisted by an independent panel. Today (16 May) a judging panel met with each of the finalists and have selected winners in four categories:

- Commercial Impact
- Social Impact
- International Impact
- Early Career Impact

The judges have also selected one overall Innovator of the Year. Winners in each category will receive a £10,000 award and a trophy. The overall Innovator of the Year receives a further £10,000.

This year, we are celebrating the 10th anniversary of the Innovator of the Year awards.

For more information, please see https://bbsrc.ukri.org/news/features/innovation/

Follow the campaign on #IoY18
Dr Neil Gibbs
The University of Manchester/Curapel Ltd

Chronic skin diseases such as eczema and psoriasis are common, incurable and distressing. Curapel, a company spun out of The University of Manchester by Dr Neil Gibbs in 2014, has raised over £1.8 million in grant (BBSRC, UMIP) and equity (Angel, Development Bank of Wales) investment to develop and clinically validate a portfolio of innovative, safe and patent-protected natural technologies that address a large unmet clinical need and substantial market (>£25 billion) for these conditions.

In 2017 the company launched pellamex, a nutritional supplement for adults that ‘feeds filaggrin’, a skin barrier protein that is often defective in eczema. The clearest unmet need for safer products is in infant children, one in five of whom experience eczema. Curapel is currently conducting a clinical study in this age group and expects to launch an infant version of pellamex before the end of 2018. In early 2019, with clinical assessment completed in Denmark, the company aims to launch a cream containing patented natural actives for psoriasis.

Based in Cardiff, Curapel continues to successfully translate academic research to commercial products that safely address unmet clinical needs of people with chronic skin conditions whilst maximising returns for shareholders and the wider British economy.
Dr Marko Hyvonen

University of Cambridge

Dr Marko Hyvonen’s group studies growth factors, a family of proteins that are responsible for the early development of vertebrate embryos, regulating biological functions, and controlling repair in adult animals. These proteins have complicated chemical structures, and the team has developed specialist techniques to make them so they are biologically active outside the organism.

Many growth factors, activins in particular, are used as critical tools by researchers studying stem cells: cells which have the unique ability to form many of the specialist cells in our bodies. Stem cell-based technologies are paving the way to new medicines and improving fundamental understanding of disease. Marko’s group have made proteins for the Cambridge stem cell community for the last decade, helping to accelerate discoveries in this field. Recent innovations in stem cell biology have given rise to applications in disease modelling, drug screening, precision medicine and development of new therapeutics. In turn, this is driving demand for higher quality and innovative growth factors. In 2016, Marko and Dr Catherine Onley founded QKine Ltd to manufacture optimised, high quality proteins in the UK to address this need and support the growing regenerative medicine industry.
Professor Trevor Dale, a biologist, and Dr Marianne Ellis, a chemical engineer, realised that by working together they could solve a problem that was preventing pharmaceutical companies from using 3D clusters of cells called ‘organoids’ in drug discovery. Together Trevor and Marianne designed a bioreactor process that automated organoid growth and expansion – generating large batches of high quality 3D cell clusters that will be essential for the widespread adoption of organoid technology.

There has been huge excitement about the new avenues of basic research that organoids have opened up, leading to the nomination of organoids as the ‘Method of the Year 2017’ in the journal *Nature Methods*. Current hand-produced ‘boutique batches’ of organoids vary too much to be used for the large numbers of tests that are carried out during the first few years of drug development.

In 2013, Marianne and Trevor established Cellesce Ltd to commercialise the technology. Cellesce are now developing normal and cancer organoids from additional tissues and have started supplying customers with batches of colon cancer organoids.
Fungicides play a key role in disease control in crops, a vital part of ensuring global food security. Resistance to fungicides is already a major cause of yield reduction and subsequent environmental degradation, and it is on the increase. Fungi respond to conventional fungicide use by activating an enzyme called the alternative oxidase (AOX), which changes the way that they respire to avoid relying on the respiratory protein targeted by fungicides, compounding resistance.

Professor Tony Moore and his team have studied the structure and function of AOX in a number of organisms, supported by funding from BBSRC. This work has led to the development of a series of promising anti-fungal candidates, which inhibit AOX and are relatively simple to synthesise. An Industrial Partnership Award with Agform Ltd, and the establishment of new AOX laboratories at Agform’s facilities, has accelerated this vital research and resulted in the development of fungicide resistance inhibitors marketed by spin-out company AOX Technologies Ltd. The research has potentially huge implications, both in terms of protecting vital yields of the world’s major cereal crops, and lessening the environmental damage caused by multiple applications of fungicides. The fungicides also work against human fungal pathogens such as Candida auris, opening exciting new avenues for this technology.
Ineffective decision-making in emergency settings can be costly and life threatening. Aside from the impact of the £8.3 billion annual cost to the economy from fire, the risk to human life is considerable. For example, human error is the cause of most firefighter injuries (across around 700,000 incidents per year), and there have been a series of high-profile cases where the capacity of different agencies to work together has been criticised.

Research at Cardiff University led by Professor Rob Honey and Dr Sabrina Cohen-Hatton has underpinned changes to the UK national operational guidance to incident commanders in the UK fire and rescue services, and to multi-agency groups who deal with major incidents. The BBSRC-funded research led to the investigation of firefighter decision-making at real and simulated emergencies, with the support of the UK National Fire Chiefs Council and National Operational Guidance Programme. The changes to guidance involved the introduction of ‘decision controls’, a rapid mental checklist grounded in three simple questions: What are my goals? What do I expect to happen? Are the potential benefits worth the risks? This change – while recognising the utility of both intuitive and analytical decision-making – resulted in greater sharing of goal-directed plans between incident commanders and their firefighting crews, and improved situational understanding.
Dave Goulson’s research focusses on the science of pollinator conservation, particularly bumblebees and other wild pollinators. Worryingly, many pollinators are in rapid decline, threatening global food security. Dave engages with a broad suite of stakeholders, from gardeners and farmers to politicians. Over the past 10 years, he has developed an international outreach programme via acclaimed popular science books, articles in magazines, radio and TV interviews, and numerous public talks that have raised awareness of pollinator declines to millions of people. He has advised politicians in multiple countries on the impacts of pesticides on bees, helped Natural England to improve its policies on disease risks associated with commercial bumblebees, played a key role in an attempt to reintroduce an extinct bumblebee, and his research has led to the cessation of use of neonicotinoid pesticides on garden centre plants. In 2006, he founded the Bumblebee Conservation Trust, which now has over 10,000 members, and has involved over 2,000 people in citizen science projects. His work has led him to become involved in the debate on the future of farming and one of the biggest questions facing humanity: how will we feed 10 billion humans without fatally undermining the ecosystem services on which we all depend?
Schistosomiasis is the second most important human parasitic disease, infecting >240 million people, 90% of whom reside within sub-Saharan Africa (SSA). The WHO recently set ambitious goals for the ‘elimination of schistosomiasis as a public health problem’, through targeted Mass Drug Administration to school-aged children. This approach assumes that schistosomiasis in SSA is a human-only disease. The role of animal schistosomiasis in SSA, either in terms of disease, economic impact, or zoonotic risk for maintaining transmission to humans, has been largely ignored.

Working across Niger and Senegal, Professor Joanne Webster and her team have identified extremely high levels of schistosomiasis infection and morbidity within humans and animals. Molecular analyses revealed that the parasites infecting people were not human schistosomes as assumed. Instead, 80-100% were novel viable hybrids of human and livestock schistosome species, which has substantial implications for evolution, epidemiology and disease control.

The team has set up north-south and south-south training schemes to enhance clinical diagnostic expertise and capacity. In response to the observed need and demand for animal treatment alongside human treatment, they are now evaluating the availability and efficacy of veterinary-formula drugs to fight against animal schistosomiasis for the first time in SSA. This work is helping to inform and contribute to sustainable control and development strategies against one of the most neglected diseases of the poorest people and their livestock.
Poultry farming is one of the fastest-growing sectors of the livestock industry and is critical to global food security and poverty alleviation. Infectious diseases pose a major threat to sustainable growth of the sector, with some, such as avian influenza, also threatening human health.

Some of the most rapid growth in poultry production is taking place in Asia and South America, creating a severe disease burden in these regions. Professor Nair has led a team to establish the Global Alliance for Research on Avian Diseases (GARAD), bringing together the research community, industry and other global stakeholders. He also established the UK-China Centre of Excellence on Avian Diseases (CERAD), bringing disease control into the world’s largest producer of meat and eggs.

These alliances identified the need for innovative vaccines to protect against regional genetic diversity in viruses. The Nair group has used CRISPR/Cas9-based gene editing tools and new vectors to develop more effective multivalent vaccines. Through The Royal Society International Professorship Award with Seoul National University, he has also used gene editing technology to produce poultry with genetic resistance to avian diseases in low- and middle-income countries.
Micronutrient deficiencies (MNDs) are often referred to as “hidden hunger”, because they can arise even when a person’s energy intake is adequate, and can cause numerous diseases that create a burden at population level. Martin Broadley and Louise Ander are supporting international efforts to reduce this problem in sub-Saharan Africa (SSA) and South Asia, using their innovative “GeoNutrition” framework. The framework arose from research funded by BBSRC, NERC and others, including the spatial mapping of micronutrient pathways in UK agriculture. By building large, multidisciplinary teams from across the natural and social sciences, the team have now scaled the framework into SSA and South Asia.

GeoNutrition allows micronutrient status to be mapped in soils, crops, food and people, and testing of interventions within agricultural and food systems, helping to inform decision-making and reduce MND at geographical scales. Critical to this work has been the development of new data sharing and management methods across the public and private sector. The wider GeoNutrition team has made long-term commitments to international partnership building, capacity strengthening, and training, which includes the development of doctoral training programmes in sub-Saharan Africa. The project has recently secured major investment from the Bill and Melinda Gates Foundation (BMGF) for national-scale studies in Ethiopia and Malawi.
Vanilla remains one of the most universally popular flavours in industry. In recent years, vanilla farmers in countries like Madagascar have struggled to keep up with increasing demand and volatile market prices. Narrow genetic diversity has left plantations prone to disease outbreaks and an increased frequency in cyclones has destroyed areas of vanilla producing regions, affecting the livelihoods of thousands of small-holder farmers who depend on them. Dr Gardiner’s research investigates the link between vanilla gene expression, biodiversity, flavour profile and post-harvest processing, to improve vanilla quality and resistance to these challenges.

The outputs of Dr Gardiner’s PhD studentship at Cranfield University have landed directly in industrial R&D innovation programmes. Through global initiatives such as the Unilever-Symrise vanilla partnership, these will help to improve the resilience of over 7000 small-holder vanilla farmers and their communities. In addition to her academic research, Dr Gardiner’s accolades include receiving the Innovate UK Women in Innovation prize in 2016, and her recent appointment as Vice-President of the British Federation of Women Graduates. Looking ahead, Dr Gardiner is pursuing new projects with academic and industrial partners that target high-risk and high-value crops, as she furthers her interests and expertise in sustainable food production.
Ben Dolman and Dr James Winterburn have developed a novel technique for the production of biochemicals which can reduce production costs by more than 40%, as well as reducing energy consumption and eliminating solvent use. These biochemicals are produced by microorganisms in large-volume steel bioreactors, and a gravity-based separation device constantly separates the product from the bioreactor as it is made, allowing the process to run continuously and at increased production rates. The system can also use food wastes as raw materials, in place of food grade chemicals.

The team have generated huge industrial interest in their technology, and have collaboratively demonstrated the process at pilot scale for the production of sophorolipid biosurfactants, working with Croda, Allied Carbon Solutions and Godrej. Ben is now working at the DeepScienceVentures accelerator to commercialise the technology, and is in the process of forming spinout company Holiferm, which will work with biochemical producers for dramatic cost reductions. The technology is ready for application to sophorolipid production, and further research is underway to develop cost effective processes, first for additional biosurfactants and then in the much broader biologically-produced lipid field.
Wheat is a globally important staple crop providing over 20% of calories eaten by mankind. However, due to its large, complex genome, it has been difficult to apply advanced breeding techniques to increase yields to feed the world’s growing population. Within the last few years, the generation of at least five complementary wheat genome sequences presents a tremendous opportunity for wheat breeding. Through Dr Borrill’s involvement with two of these genome sequencing efforts, she became increasingly aware of the need for a no-nonsense centralised resource where these different sequences, associated genomic resources and their pitfalls were described and made accessible to the wheat breeding industry.

Dr Borrill has developed two user-friendly platforms to access these genomic innovations, thereby maximizing their impact on wheat research and breeding. The first is a centralised resource for information about tools and resources for wheat breeding and genomics. The second is an atlas of wheat gene expression which displays gene expression information through a user-friendly website. Both tools significantly lower the barriers to working on this vital crop species.
Finalists

**Commercial Impact**
1. Professor Trevor Dale and Dr Marianne Ellis – Cardiff University, University of Bath
2. Professor Tony Moore – University of Sussex
3. Dr Neil Gibbs – The University of Manchester/Curapel Ltd
4. Dr Marko Hyvonen – University of Cambridge

**Social Impact**
5. Professor Dave Goulson – University of Sussex
6. Professor Rob Honey and Dr Sabrina Cohen-Hatton – Cardiff University

**International Impact**
7. Professor Martin Broadley and Dr Louise Ander – University of Nottingham, British Geological Survey
8. Professor Venugopal Nair – The Pribright Institute
9. Professor Joanne Webster – Royal Veterinary College

**Early Career Impact**
10. Dr Siobhan Gardiner – Cranfield University
11. Dr Philippa Borrill – John Innes Centre
12. Ben Dolman and Dr James Winterburn – The University of Manchester
Floorplan
INNOVATOR
OF THE YEAR 2018

celebrating ten years

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UK Research
and Innovation