UKRI Biotechnology and Biological Sciences Research Council

Creating spinouts from biotechnology

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Enabling access to research

Maximising impact

Foreword

Dr Alex Chaix, Joint Head of Knowledge Exchange and Commercialisation at the Biotechnology and Biological Sciences Research Council (BBSRC), part of UK Research and Innovation (UKRI)

At BBSRC, our vision is to push back the frontier of biology in order to deliver a healthy, prosperous and sustainable future. Our mission is to advance fundamental understanding of biology by investing in frontier bioscience.

Between 2004 and 2018, researchers supported by BBSRC helped establish 234 spinout companies, of which 163 are still active. These companies operate throughout the UK in ten different industrial sectors and employ between 2,019 and 4,037 people. Those 234 companies originated from 56 different research organisations (universities or research institutes) and are linked to £139 million of BBSRC investments. Taken together these companies have raised more than £1.3 billion of private investments over the years.

Analysis of data from our research community (via the output reporting system Researchfish®) helps councils like BBSRC understand the optimal route to impact and how our investments can make a difference.

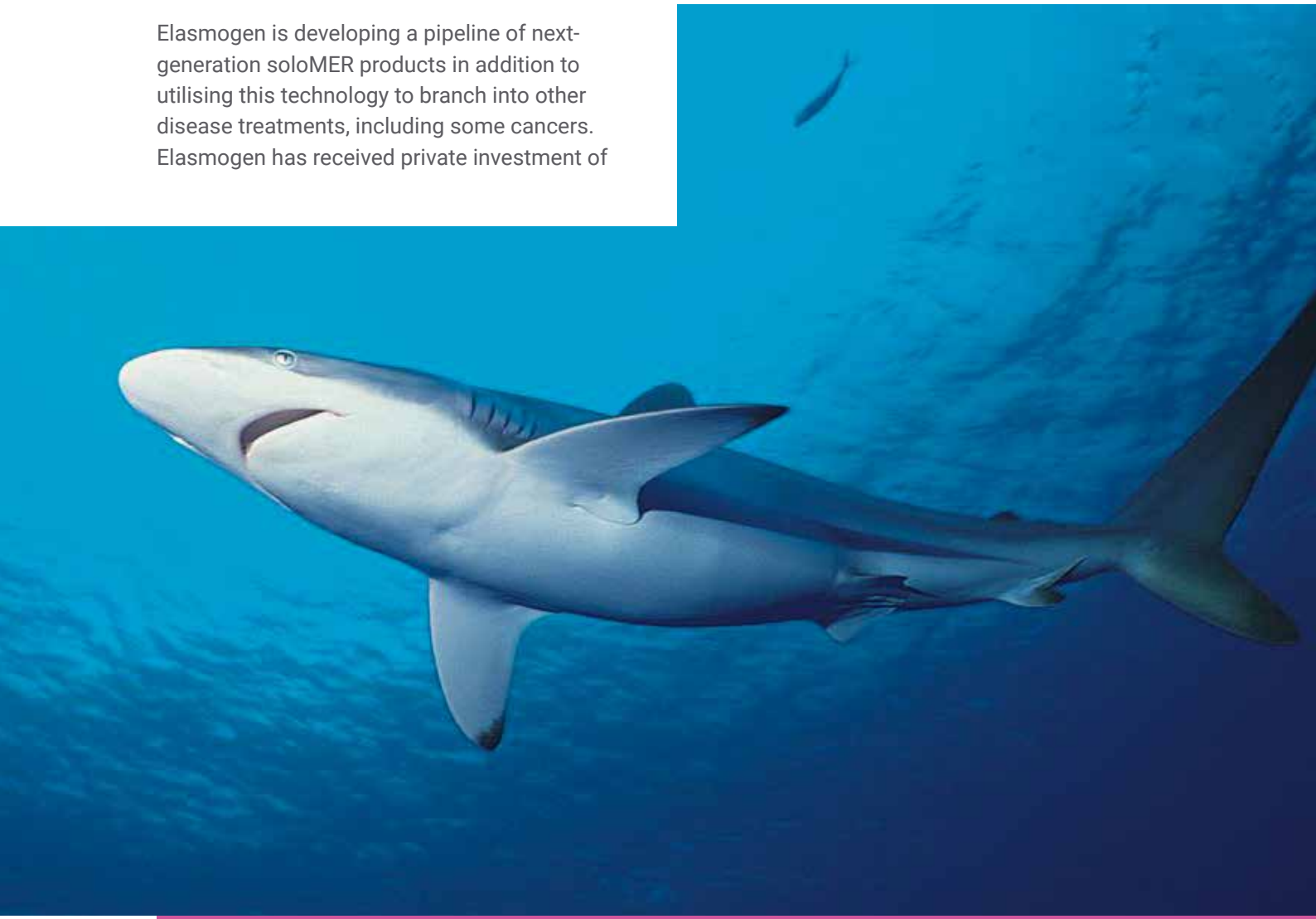
This document brings together a few examples of spinout companies that exemplify how BBSRC investment is making a difference.

Elasmogen

Elasmogen is a biotechnology company originating from the University of Aberdeen, run by Chief Executive Officer (CEO) Dr Caroline Barelle and Chief Technology Officer (CTO) Professor Andrew Porter. The company develops novel medicines to target inflammatory diseases of the eye and the gut as well as treating solid tumours.

The technologies now implemented by the company are designed to generate new medicines based on antibody-like molecules called VNARs (variable-domain new antibody receptors), which are isolated from sharks. These VNARs are humanised, resulting in soloMERs, which can be used to target and treat disease in humans.

Elasmogen is developing a pipeline of next-generation soloMER products in addition to utilising this technology to branch into other disease treatments, including some cancers. Elasmogen has received private investment of more than £4.1 million as of February 2020, and has continued to utilise UKRI investments and programmes, including BBSRC LINK Grant and BBSRC industrial CASE studentships and also Innovate UK Knowledge Transfer Partnership programme, Research & Development (R&D) grants and Biomedical Catalyst. These grants have helped the company to strengthen collaborations with universities, nurturing talent and developing a successful academic-industry base. Dr Caroline Barelle, said; “We have had incredible support from the BBSRC throughout the pre and post-spinout life of the company.”



Case Study – Elasmogen

Effective collaboration and knowledge exchange strategies have enabled Elasmogen to prosper and contribute to the UK's innovation economy. Elasmogen currently holds six patent families as part of their Intellectual Property portfolio, which consists of more than 40 patents and divisionals pending and granted worldwide. Collaborations with Almac Discovery Ltd have contributed to de-risking private investments and further grant success from Innovate UK. In addition, a collaboration with Merck Group not only solved the company's bio-processing problem but demonstrated Elasmogen's commitment to inspiring talent and promoting skills development.

Elasmogen is a relatively recent venture that has proven fruitful in its scientific endeavour and technological advancements, showing great potential in revolutionising the way inflammatory diseases are treated.

MediSieve

MediSieve aims to revolutionise the treatment of life-threatening blood-borne diseases by physically removing specific disease-causing substances from the bloodstream using a novel magnetic blood filtration technology. This new technology aims to work alongside conventional pharmacological treatments.

MediSieve is an innovative biomedical engineering device company originating from University College London by Dr George Frodsham (CEO).

Dr George Frodsham undertook a PhD at UCL in Biochemical Engineering and, following support from a BBSRC-funded Royal Society of Edinburgh Enterprise Fellowship, spun-out the company in 2015.

The technology developed by MediSieve has similarities to dialysis, used to filter the blood of people whose kidneys no longer function properly. It uses an external blood loop to capture and remove disease-causing agents for certain diseases such as malaria, sepsis and leukaemia. However, the MediSieve version

of the external blood loop utilises specially-engineered biocompatible magnetic particles to target and bind to specific components of the blood. Magnetism is used to extract the magnetic particles and disease-causing components bound to them. The process occurs outside the body.

By providing doctors with a tool to physically remove (rather than kill) specific components, the platform technology has the potential to provide significant benefits to patients with a wide range of medical conditions.

MediSieve has consistently shown success in acquiring grants from UKRI and other funders, including the Wellcome Trust, in addition to private investment from angel investors. This includes support from Innovate UK (SMART, Biomedical Catalyst) raising a combined total of over £4 million over the past four years.

As of February 2020, the IP portfolio of MediSieve included a patent for its magnetic blood filtration granted in the US. In addition to this successful patent, there is a further patent pending in the US, and two patents pending in Europe, Canada, Japan, China, India, Brazil, and Australia.

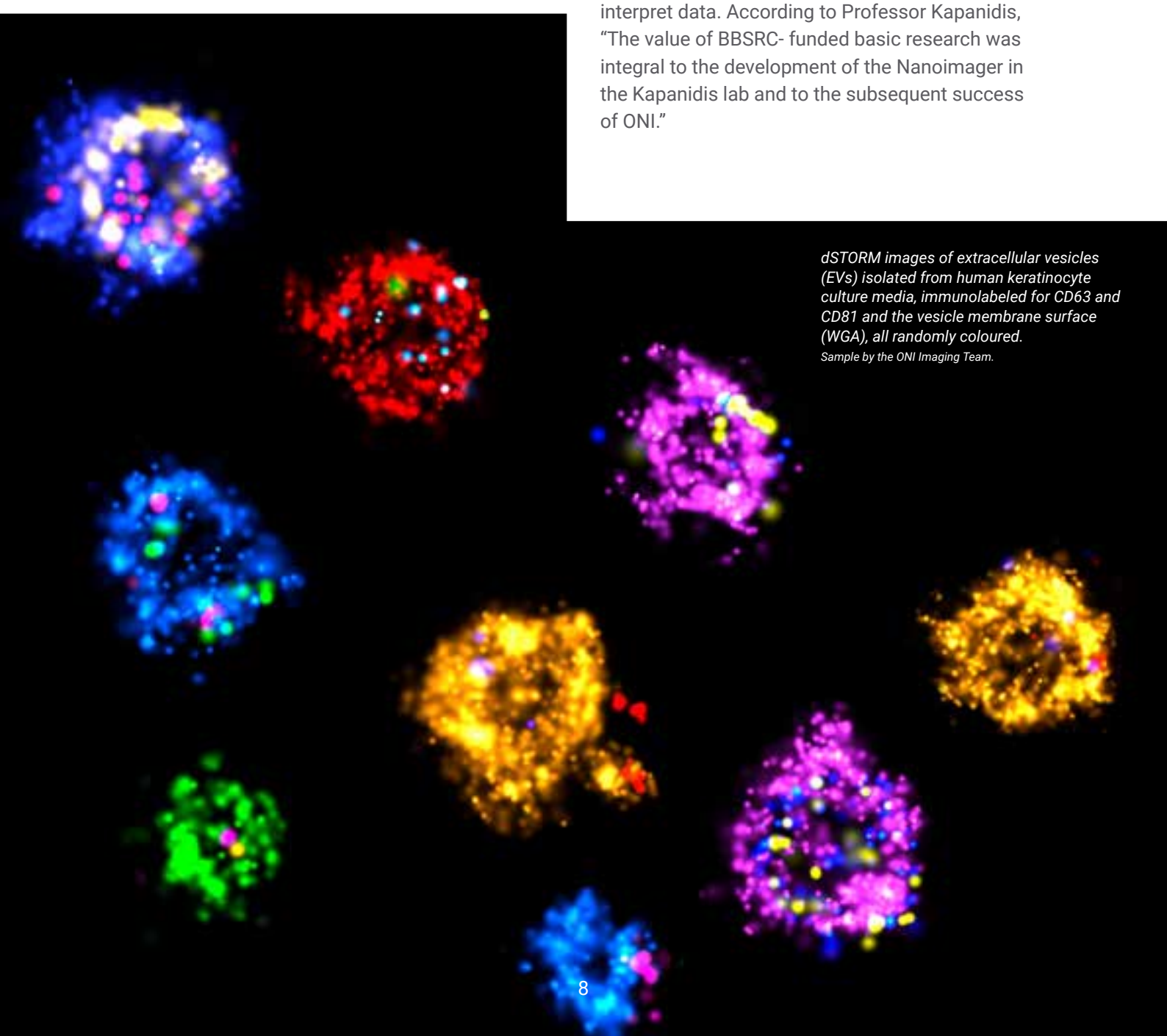
In 2019 MediSieve CEO, Dr George Frodsham, was awarded Innovator of the Year in the Early Career Impact category at the BBSRC Innovator of the Year awards.

The company continues to explore applications for their disruptive technology with the aim of launching their malaria treatment in 2021. Clinical trials involving humans are intended to commence in the first half of 2020.

Oxford Nanoimaging

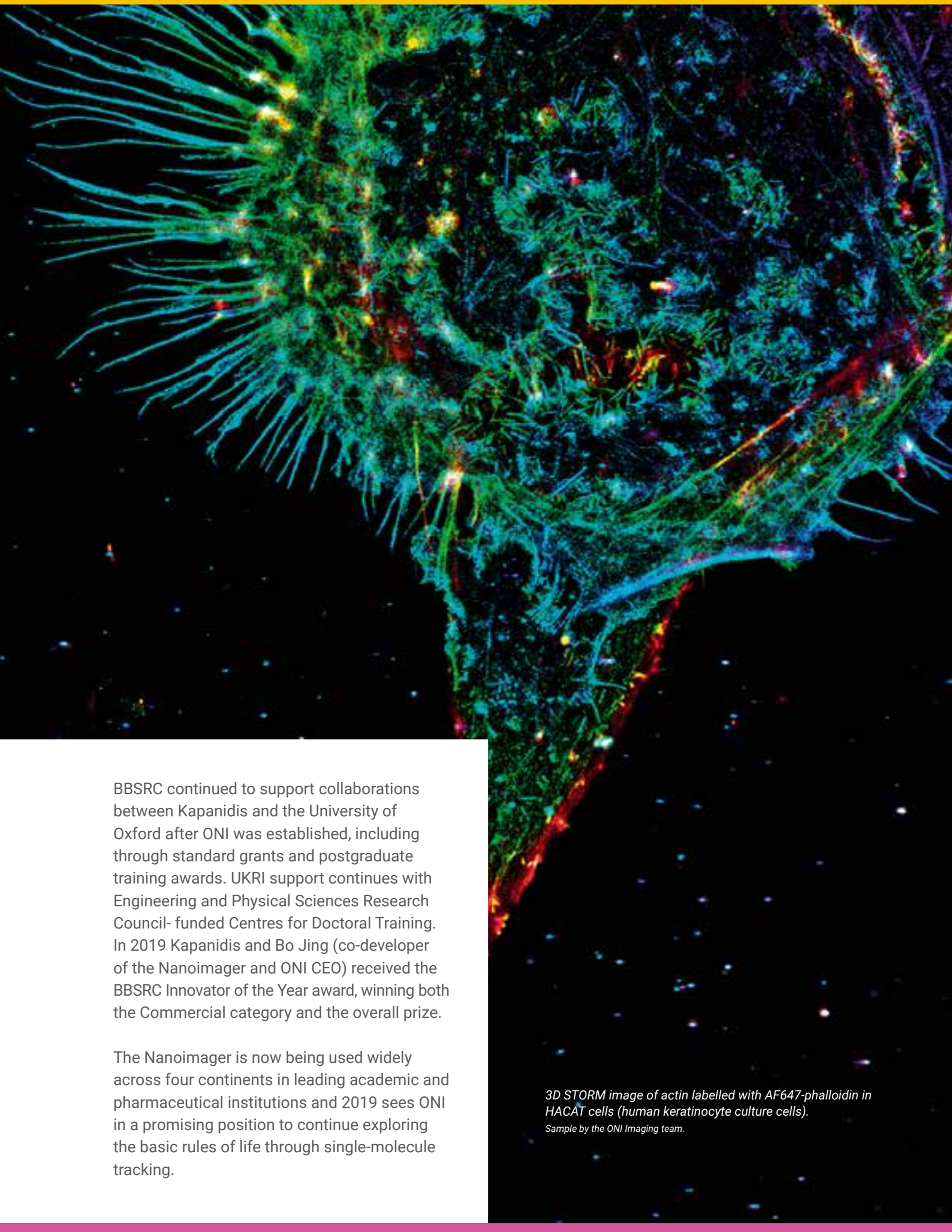
Oxford Nanoimaging (ONI) was established as a spinout from the University of Oxford in 2016. The company works in the field of super-resolution microscopy, creating advanced fluorescence microscopy instruments that are more accessible and affordable than conventional models. Their novel microscopy focuses on revolutionising the way microscopy work is conducted, supporting advances in fields as diverse as the study of extracellular vesicles, neuroscience and immuno-oncology.

The BBSRC has awarded over £5 million to one of the founders of ONI, Professor Achillefs Kapanidis, via multiple grants over a 13-year period. Early stage proof of concept research was supported by BBSRC and such work contributed to the foundations for the development of the Nanoimager, a super-resolution microscope that detects single fluorescent molecules. Uniquely, it can be transported easily and is small and stable enough to operate optimally on a benchtop. The Nanoimager is supported by sophisticated image and data analysis, which is vital for super-resolution work enabling researchers to quickly interpret data. According to Professor Kapanidis, "The value of BBSRC- funded basic research was integral to the development of the Nanoimager in the Kapanidis lab and to the subsequent success of ONI."



dSTORM images of extracellular vesicles (EVs) isolated from human keratinocyte culture media, immunolabeled for CD63 and CD81 and the vesicle membrane surface (WGA), all randomly coloured.
Sample by the ONI Imaging Team.

Case Study – Oxford Nanoimaging



3D STORM image of actin labelled with AF647-phalloidin in HACAT cells (human keratinocyte culture cells).
Sample by the ONI Imaging team.

BBSRC continued to support collaborations between Kapanidis and the University of Oxford after ONI was established, including through standard grants and postgraduate training awards. UKRI support continues with Engineering and Physical Sciences Research Council- funded Centres for Doctoral Training. In 2019 Kapanidis and Bo Jing (co-developer of the Nanoimager and ONI CEO) received the BBSRC Innovator of the Year award, winning both the Commercial category and the overall prize.

The Nanoimager is now being used widely across four continents in leading academic and pharmaceutical institutions and 2019 sees ONI in a promising position to continue exploring the basic rules of life through single-molecule tracking.

Oxitec

Aedes aegypti mosquito.

Oxitec evolved from BBSRC-funded blue-sky research from the University of Oxford. The company is developing genetically-engineered insect strains, including mosquitoes, that can be used to tackle insect-borne diseases such as dengue fever and as a non-chemical pest control mechanism for agriculture pests. They do so using a 'self-limiting gene' that allows them to reduce insect populations, including those of disease vectors and pests.

Since Oxitec's inception, the company has been an active partner with the UK academic research community, collaborating on numerous BBSRC grants, notably through 28 iCASE PhD studentships and Innovate UK R&D grants.

The success and potential of Oxitec's technology was recognised at an international level, resulting in the US biotechnology company, Intrexon,

acquiring Oxitec for $160 million (£123m) in 2015.

Since the change of ownership, Oxitec has maintained its research presence in the UK, contributing to the UK's innovation economy. Oxitec has supported UK talent development via recruitment of scientists to their UK office and by supporting early career BBSRC-funded researchers through Professional Internships for PhD Students (PIPs).

Oxitec CEO Grey Frandsen said, "Oxitec has benefited from the support that the BBSRC has provided in its early development, and continues to benefit from the UK's innovation economy. As the need for our technology grows, we rely on exceptional talent and an encouraging science ecosystem, which BBSRC plays such an important hand in sustaining."

Oxitec continues to engage internationally and works with researchers from across the globe to advance trials of their genetically engineered insects in order to tackle the strategic challenges we face in disease vector control and agricultural pest mitigation.

Diamondback moth flying. ©Oxitec

About BBSRC

BBSRC is part of UK Research and Innovation, a new body which works in partnership with universities, research organisations, businesses, charities, and government to create the best possible environment for research and innovation to flourish. We aim to maximise the contribution of each of our component parts, working individually and collectively. We work with our many partners to benefit everyone through knowledge, talent and ideas.

We invested £498 million in world-class bioscience in 2017-18. We support around 1,600 scientists and 2,000 research students in universities and institutes across the UK.

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