

Results of competition:

Technology-inspired innovation - January 2014 - Biosciences - Feasibility study

Total available funding for this competition was £2m from the Technology Strategy Board.

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

| Participant organisation names | Project title | Proposed project costs | Proposed project grant |
|--|---|------------------------|------------------------|
| Acidophil | Novel bioreactor design for fermentation of syngas to industrially relevant chemicals | £33,300 | £24,975 |
| Project description - provided by applicants | | | |
| <p>Synthesis gas, also known as syngas, is a gas that can be produced from a number of carbon neutral and waste feedstocks, including biomass and municipal wastes. Syngas can be used to make a large number of useful fuel and industrial chemicals via microorganisms that can consume syngas as their sole source of energy. However, since the syngas does not dissolve well in liquid, it is a challenge to develop systems that will allow the microorganism to access enough syngas to produce its target compounds rapidly enough for economic feasibility.</p> <p>Acidophil has designed a novel growth chamber that is expected to increase the rate at which syngas can be taken up by the microorganism. This project is designed to generate a prototype and proof of concept data of this novel system. Successful completion will advance a technology that has the potential to dramatically expand the number of chemicals that can be economically produced from waste material via fermentation of syngas.</p> | | | |

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| Advanced Pest Solutions Ltd | Mushroom Production: Integration of Novel Bacteriophage Biocontrol Technology | £27,291 | £20,468 |
| Project description - provided by applicants | | | |
| <p>The UK mushroom market is facing fierce import competition from EU growers and together with rising operating costs, the number of UK growers and their outputs are declining. Imports now make up more than half of the UK marketed total. The UK mushroom industry needs to gain a competitive advantage and this application aims to provide this through novel control of the most serious bacterial disease of mushrooms; bacterial blotch, responsible for crop losses of up to 10%, representing losses of approx. £20 m p.a.</p> <p>This feasibility study will examine the potential of an innovative, natural antimicrobial technology (based on highly-specific, safe antibacterial agents: 'bacteriophage') to reduce the incidence of this disease, through developing treatments for the growing mushrooms themselves and also, for the compost and peat material in which they grow and which are likely to be major sources of the bacterial pathogens.</p> | | | |

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| Aragreen (UK) Limited | Control device for advanced bioreactor photonics | £31,607 | £23,705 |
| Project description - provided by applicants | | | |
| <p>The project will seek to develop a photonics control system for a novel bioreactor capable of producing a range of micro-algae. The photonics and associated control system, will be the core technology in a 300l bench scale photobioreactor developed by Aragreen (UK) Ltd.</p> <p>At larger scale (4,000l & 30,000l) this PBR will be capable of operating efficiently in the UK's climate, will utilize only a small land footprint and can be operable using treated water from waste water treatment works, as the key feedstock in algae production. Such a control system will enable to company to progress research into the effects of photonics on algae cultivation and yield improvement. The objective is to create a first generation of smart lights for a new generation of algae photobioreactors.</p> | | | |

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| Arrow Labs | Fully Automated Analysis of Parasitic Egg Cells in Faecal Preparations | £33,000 | £24,750 |
| Project description - provided by applicants | | | |
| <p>The detection and hence targeted control of parasitic worms in grazing livestock, domestic pets and humans in developing countries is of increasing worldwide interest as anthelmintic drug resistance and hence ineffectiveness takes hold.</p> <p>This proposal aims to prototype an automated, portable digital analyser for cytological samples which, in conjunction with cloud based digital image enhancement will provide data sufficiently rich in detail to allow automated machine counting of worm egg cells present in a faecal sample.</p> <p>Such a device has the prospect of being affordable, simple to use, rugged and compact. Automated faecal egg counts will lead to more efficient production of animal products, attenuation of greenhouse gas emissions by livestock, and benefit society at large from more sustainable, ethical and secure food production. Cattle, sheep, goats, pigs, horses, domestic pets and potentially humans will benefit from improved health and welfare.</p> | | | |

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| Avanticell Science Limited | Environmental Sampling for Nanosafety Testing | £33,284 | £24,963 |
| Project description - provided by applicants | | | |
| <p>The Study will test the feasibility of developing a novel collection device for sampling of workplace or domestic environments and testing of the collected samples for their health risk. The sample collector will be designed principally to capture sub-microscale materials that are increasingly part of industrial manufacturing and new products.</p> <p>Sample collection will address an unmet need to evaluate the impact of such materials on human biology. Therefore, sample collection will be followed by sample presentation to an ethically-attractive cell culture system based on cell types able to detect these materials, and provide a measurable response indicating their biosafety risk. Ultimately, the system shall have application in the testing, under laboratory or field conditions, of workplace or environmental samples for nanosafety risk.</p> | | | |

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| Avanticell Science Limited | Cryopreservation of complex models for cell-based analysis | £33,260 | £24,945 |
| Project description - provided by applicants | | | |
| <p>The project shall test the feasibility of delivering complex cell culture models as frozen products, assembled in one central facility. These complex cell models are required by industry to answer important questions about candidate drugs during preclinical testing, and also have use in testing of other materials with potential health benefit, such as functional foods or traditional medicines.</p> <p>The complex models shall contain human cells, to enhance their analytical value. They shall be assembled into architectures resembling their tissues of origin: the project example shall be lung cells placed so as to reproduce structures lining the tissue's airways. The freezing process shall be applied to cells pre-assembled in these structures and not, as conventionally, to cells frozen in bulk. Study success shall make the cell models available to a new commercial audience, and allow discoverers to add value to candidate therapeutics before licensing-on to pharmaceutical players.</p> | | | |

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| Badrilla Ltd | Feature display diagnostics: A new approach for a new class of medical biomarker | £33,000 | £25,000 |
| Project description - provided by applicants | | | |
| <p>An emerging class of biomarkers important in medical diagnostics for cancer, dementia and cardiovascular disease is the chemical modification state of individual proteins. Quantitative diagnostic assays for these particular features of proteins are not available, and Badrilla proposes to develop an entirely new approach that will achieve such quantitative measurements. This will allow us to diagnose cancer early using tests for these new biomarker classes.</p> <p>A research plan to critically evaluate the foundation of this technology is proposed. Upon completion of this research, Badrilla will have created new intellectual property which it will exploit in areas of unmet clinical need.</p> | | | |

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| Deliverics Limited | First-in-class fully-biodegradable DNA delivery system for biomedical research and safe gene therapy | £33,300 | £24,975 |
| Project description - provided by applicants | | | |
| <p>The transfer of foreign DNA molecules inside cells is an essential laboratory technique routinely used in biomedical research and a promising therapeutic approach to treat disorders caused by malfunctioning genes such as cystic fibrosis, inherited eye diseases and several kinds of cancer.</p> <p>Apart from the controversial virus-based carriers, DNA delivery can be achieved using chemical reagents with the ability to complex DNA molecules and translocate them into the cell cytoplasm. However, in vivo delivery is largely limited by the reagent toxicity, the DNA size and the target cell / tissue.</p> <p>In this feasibility study, DELIVERICS will investigate a novel biodegradable delivery system to achieve safe transfer of DNA inside cells in vivo.</p> <p>This unique tool will address a commercial opportunity that exists both in the R&D and Pharma sectors, where advanced delivery systems are required for R&D studies and for the therapeutic delivery of DNA-based biopharmaceuticals.</p> | | | |

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| GeneFirst Limited | GeneFirst Limited | £33,300 | £24,975 |
| Project description - provided by applicants | | | |
| <p>Personalised medicine aims to predict in advance which patients are most likely to benefit from, or not respond well to, a particular therapy. However, current methods have significant limitations in terms of both sensitivity and cost.</p> <p>Tumour biopsies, particularly from lung cancers, often provide only a tiny amount of material. Furthermore there may be change in mutations with time, and therefore repeated testing is needed at intervals during treatment, but repeated biopsy is highly undesirable for some tumour types.</p> <p>It has recently been discovered that DNA from tumours leaks into blood and can be detected, if the method is sufficiently sensitive. GeneFirst is developing a new real-time PCR based technology for detection of multiple defined mutations in a single closed-tube with greatly increased sensitivity. This is potentially suitable for detecting mutations using circulating cell-free DNA in blood.</p> | | | |

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| IS Instruments Limited | A high etendue Raman spectrometer for protein and biological measurement with fluorescence subtraction | £33,000 | £24,750 |
| Project description - provided by applicants | | | |
| <p>In this project ISI will explore new innovative solutions in protein characterisation which is crucial to engineering methods to develop proteins. Raman systems have been successfully used to study a variety of biological samples, including transmission raman measurement targeted at the detection of cancer. However these target proteins and biological samples are often inhomogeneous in nature and can suffer from a high fluorescent background.</p> <p>This study will investigate the feasibility of producing a new, dual wavelength, high etendue Raman spectrometer that can remove the fluorescent background whilst making both transmission and spatially offset bulk measurements of these samples. This system should allow faster characterisation with better bulk measurement, improving the accuracy of the observation.</p> | | | |

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| M Squared Lasers Limited | Tunable Laser Source for Confocal Microscopy | £31,788 | £23,841 |
| Project description - provided by applicants | | | |
| <p>Confocal microscopy is one of the most widely used techniques in biosciences. High resolution images are produced through laser excitation of fluorescent molecules in the blue-green region of the spectrum. Lasers provide light at only a few fixed wavelengths and this limits the brightness of the image. M Squared proposes to overcome this limitation by developing a continuously tuneable laser source covering the whole region of relevance to confocal microscopy.</p> <p>The project will deliver a demonstrator using a novel approach. Given the size of the market, the potential return on investment over 10 years is well in excess of 100 times. M Squared is an early stage business whose growth is highly reliant on technological development and innovation. Funding from the Technology Strategy Board is essential to offset the risks of undertaking this ambitious research project.</p> | | | |

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| Medifit Instruments Limited | A Non-Invasive digital wireless epilepsy seizure detection biosensor for continuous and real-time monitoring of the Autonomic Nervous System on a mobile device platform. | £33,000 | £25,000 |
| Project description - provided by applicants | | | |
| <p>We are proposing the first ever non-invasive real-time biosensor for monitoring the Autonomic Nervous System on a mobile device platform. This will be a compact and low cost wearable biosensor which will have multiple medical applications since we will be continuously measuring the brainstem in real-time. The biosensor will be versatile and users will have unrestricted continuous measurements regardless of location.</p> <p>This project will give patients the unprecedented ability to perform comfortable, unobtrusive long-term monitoring anywhere. Hospital treatments can also be stream-line and made more efficient as the cost of in-hospital treatment is prohibitive. The implementation of our technology will lead to reduce hospital time, reduce the use of NHS resources, improve diagnostic capabilities and can add insight and provide invaluable research opportunities in widespread areas of neurological conditions.</p> | | | |

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| Navlconix | Geometry data processing pipeline for Navlconix | £32,518 | £24,389 |
| Project description - provided by applicants | | | |
| <p>Fast cardiac mapping and navigation are desirable for use in patients with arrhythmias, who increasingly undergo invasive cardiac mapping and catheter ablation procedures. These procedures are demanding, time consuming and stressful for both patients and healthcare professionals. Novel technology of NAVICONIX is being developed to make these procedures quicker, simpler, requiring less operator skill, and less risky for the patient including complex procedures like atrial fibrillation and scar-related ventricular arrhythmias.</p> <p>The technology provides at its core automated geometry processing algorithms. These are necessary to obtain a reliable mathematical framework for inverse electrocardiography in each individual patient and for on-the-fly geometry adaptation during cardiac procedures.</p> | | | |

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| Phytoceutical Limited (lead) Xigo Nanotools Limited | Formulation and delivery approaches for water soluble biological products delivered through the skin focussing on L-Ascorbic Acid. | £32,900 | £24,675 |
| Project description - provided by applicants | | | |
| <p>The project is a collaboration between Phytoceutical and XiGo Nanotools, a company expert in measuring and optimising nanoparticles, to test the feasibility of novel formulation and delivery methods of water-soluble actives to the skin.</p> <p>Phytoceutical has development expertise in the areas of natural products used as ingredients in skin treatments and XiGo Ltd has expertise that may help test, measure and to stabilise such products to enable improved skin delivery. By combining these two areas of expertise the project aims to develop new formulation methods that can be used in the future to manufacture improved skin treatment products.</p> | | | |

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| ProKyma Technologies Limited | Method to enhance sequencing ability to detect cancer mutations | £33,000 | £24,750 |
| Project description - provided by applicants | | | |
| <p>Around 880 people are diagnosed with cancer in the UK every day - that's one person every 2 minutes. Fortunately treatment is getting better and most people survive and recover from the initial cancer, but secondary re-occurrence is a major problem and results in most deaths. 50% of all new cases will die within 5 years. Research is focusing on the spread of cancer through the blood stream, via Circulating Tumour Cells.</p> <p>We are developing a method to measure the numbers of these cells to guide the surgeon to develop more individualised treatments and as an early warning blood test to detect the re-appearance of the cancer cells. Our product uses a unique cell capture technology linked to state-of-the-art sequencing techniques and this project focuses on improving the performance and reducing the costs of the cell capture module. The sequencing improvement will be tested at the University of Liverpool.</p> | | | |

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| Protein Technologies Ltd (lead) Asymptote Limited | Glass Transition Biosensors for Regenerative Medicine | £28,480 | £21,360 |
| Project description - provided by applicants | | | |
| <p>The objective of this project is to examine the feasibility of employing fluorescent proteins as a visual means of monitoring the glass transition (T_g) of the solutions in which stem cells are stored and transported as they pass through the cold chain. The T_g of such solutions is the single most critical determinant of patient safety: at temperatures higher than T_g, diffusion and chemical reactions will quickly result in a dangerous loss of function.</p> <p>In this project, we will undertake a series of experiments designed to closely calibrate the light emission levels of a particular class of fluorescent proteins with the viability of a number of well-characterized stem cells such that a loss of colour can be shown to be a reliable indicator of T_g.</p> | | | |

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| RowAnalytics Limited | Integrated decision support for agricultural production | £33,177 | £24,883 |
| Project description - provided by applicants | | | |
| <p>This project will build a demonstrator to support crop yield improvement by integrating and exploiting plant phenotyping and ‘omics data. This is a strategically important area of unmet need both in the UK and globally, where optimising the combination of inputs, treatments, doses & timings to apply to specific crop strains in a specific growing environment is a massively complex challenge.</p> <p>We will build a semantic knowledge graph of crop strains, traits (both genomic variant and from integrated non-destructive phenotyping technologies), yields, soil conditions and wider growing environment including remote sensing data. We will compile this knowledge model and deploy it as a demo tablet app with a simple decision support UI to allow non-IT specialist growers to identify specific combinations of treatments that enable them to optimise crop yields and minimise wastage of inputs.</p> | | | |

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| Ruskinn Technology Limited | H-GMP - Good Manufacturing Practice in an Hypoxic Environment | £32,250 | £24,187 |
| Project description - provided by applicants | | | |
| <p>Ruskinn's core business is the development and manufacture of sealed Hypoxic (low O₂) and Anoxic (zero O₂) "glove port" workstations for cell biology, stem cell research and microbiology applications. Until now, Ruskinn has sold its products for research applications primarily in universities and hospitals. Now a new market in cell culture manufacturing in accordance with Good Manufacturing Practices (GMP) is emerging.</p> <p>The innovation explored in this feasibility study is to automate decontamination with a defined and repeatable protocol. As an adjunct, methods for preventing mitigating cross-contamination between cell cultures will also be explored.</p> | | | |

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| Science Practice | Sequence Bundles: Prototyping a Novel Data Visualisation Tool for Bioinformatics | £32,600 | £24,450 |
| Project description - provided by applicants | | | |
| <p>Biological sciences depend today on high throughput DNA sequencing and collecting large amounts of data. Scientists require bespoke methods and tools to collate, visualise, explore and interpret this wealth of information.</p> <p>Our study will address this emergent need by prototyping a new bioinformatics data visualisation tool called Sequence Bundles. We created Sequence Bundles in 2013 to visualise hundreds of protein and DNA sequences in one image. Sequence Bundles are useful for finding interesting features in biological data that would otherwise remain hidden.</p> <p>We aim to run our Sequence Bundles prototype as a web-application and this study is designed to show if it is technically possible. We will design a user-friendly interface for the prototype and test how well it works. By developing Sequence Bundles as a software tool, we will enable scientists to make better sense of their biological data, potentially aiding new discoveries in biology, drug development and beyond.</p> | | | |

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| VIVA Bioscience Limited | Novel cell-based assays for drug screening and toxicity testing | £29,976 | £22,482 |
| Project description - provided by applicants | | | |
| <p>Development of therapeutic drugs for Alzheimer's, Parkinson's and other neurodegenerative diseases is one of the key commitments agreed at the G8 Dementia Summit in December 2013 in London.</p> <p>VIVA proposes a feasibility study for the testing and validation of novel molecular tools and cell-based assays for use in the discovery and development of drugs for the treatment of such conditions.</p> | | | |