High Value Biorenewables

HVB in action: Flexible Fund

- **Total fund: £1.41M**
- **8 Proof of Concept (PoC) studies awarded**
- **15 Business Interaction Vouchers (BIV) funded**
- **Committed so far: £507k**

BIV Up to £10,000
6 month project – apply by 29 Mar 2022 for April review

PoC Up to £50,000
1 year project – new call to be announced

Enterprise Fellowship Up to £70,000
Call closed

For more information visit
www.highvaluebiorenewables.net/funding

UKRI Biotechnology and Biological Sciences Research Council

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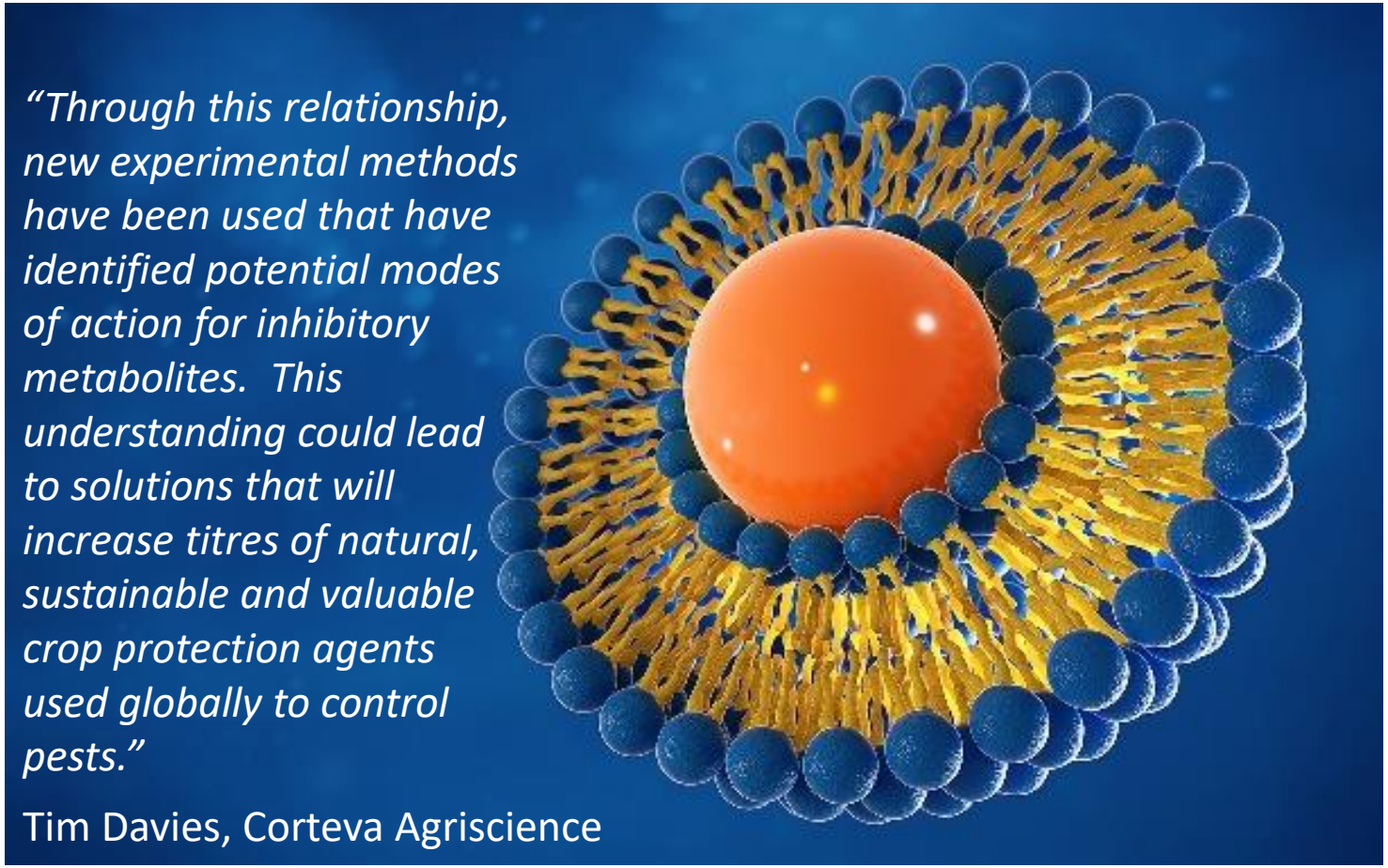
Business Interaction Vouchers

Biotechnology and Biological Sciences Research Council

Characterising toxicity at the cell membrane during spinosyn biosynthesis

Alan Goddard, Aston University & Tim Davies, Corteva Agriscience



- Spinosyns are insecticides made by *Saccharopolyspora spinosa*
- Production of spinosyns is limited by toxicity of intermediate metabolites
- Results indicate these metabolites cause pore formation in membranes, disruption of the proton gradient and loss of membrane integrity, thereby limiting production and yield
- Establishing this model provides a route for strain engineering for greater spinosyn yield by increased tolerance to these metabolites

Aston University BIRMINGHAM UK

CORTEVA™ agriscience

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Biotechnology and Biological Sciences Research Council

Investigating the viral inhibitory effects of sulphated, polysaccharide heparin analogues with the SARS-CoV-2 Spike RBD protein

Mark Skidmore, Keele University & Ruth Yates, Anglo-Italian Chemometrics Limited

"The award of a HVB BIV has proved invaluable in demonstrating proof-of-concept for our technology platform and has cemented a highly productive and rewarding relationship between the academic and industrial partners. The HVB BIV has fostered a legacy that will extend beyond the duration of the award."

Mark Skidmore, Keele University

- Pharmaceutical heparin inhibits SARS-CoV infection of host cells and has shown promising results for COVID-19 patients
- Heparin has a global supply problem
- High value, sustainable and renewable analogous heparin compounds generated from plants and algae, or as by-products from industrial production processes
- Produced a suite of tailored-made, heparin analogue polysaccharides with highly favourable antiviral bioactivities

Keele UNIVERSITY

AN-ITA

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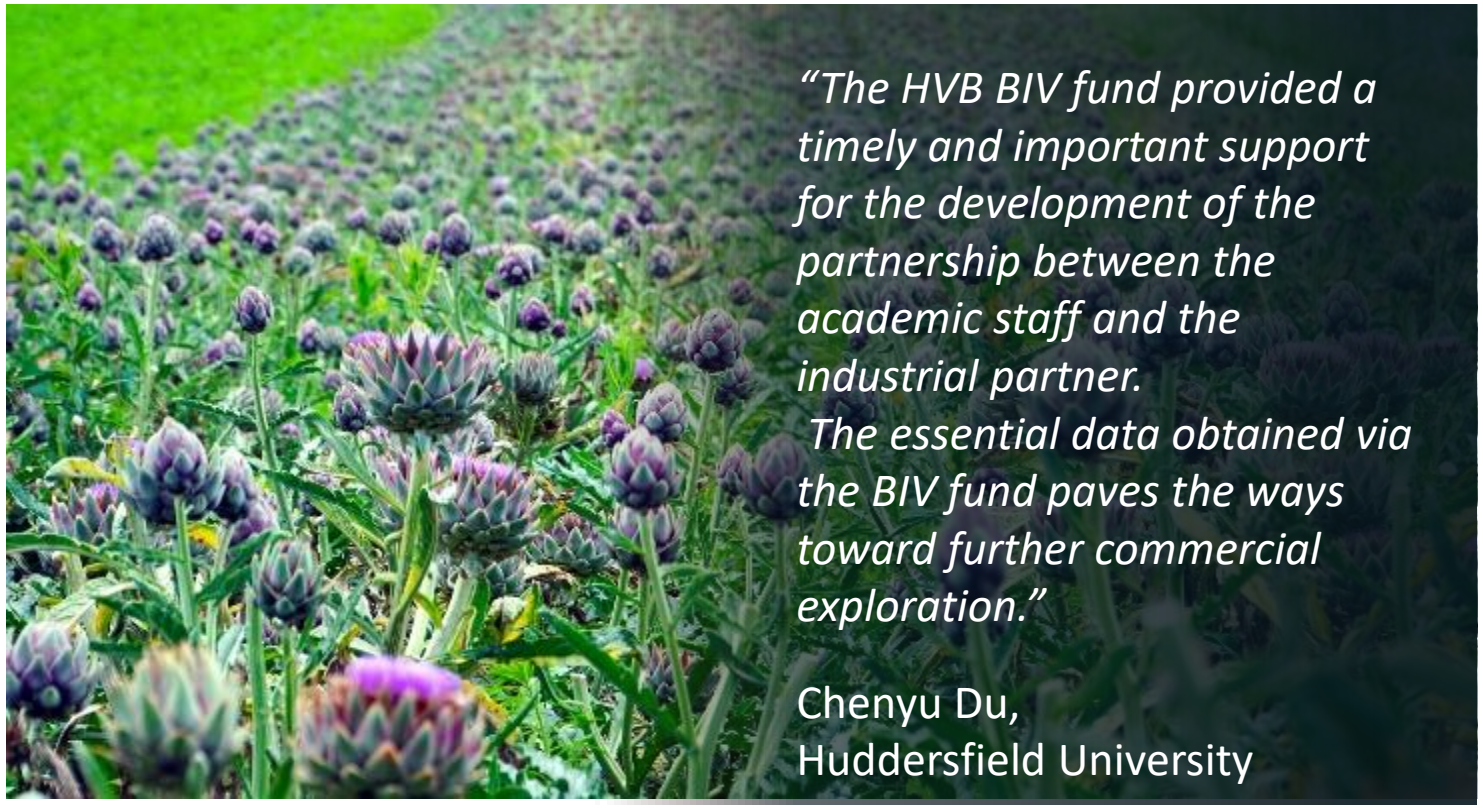
Biotechnology and Biological Sciences Research Council

Development of an integrated process for the production of functional food additives from Jerusalem artichoke tubers

Chenyu Du, University of Huddersfield & Michael Lewis, Heugh Farm



- Jerusalem artichoke (JA), used as a cover for pheasant husbandry and not harvested in UK
- JA is rich in inulin – a source of dietary fibre that can control blood sugar disorder
- Inulin extracted from JA with good yield, and a nutrient supplement made by fermentation of the extraction waste
- Techno-economic analysis supports further development of the process to exploit JA for healthy dietary fibre functional food and a protein/mineral rich nutrient supplement

University of HUDDERSFIELD

High Value Biorenewables

Proof of Concept

Biotechnology and Biological Sciences Research Council

Development of a new biocatalytic process to generate high value chemicals from lignin

Neil Bruce & Simon McQueen-Mason, University of York & Kirk Schnorr, Novozyme

- Tricin is a high value component of lignin, with reported anticancer, antioxidant and anti-aging properties
- A new ligninase from the soft rot fungus *Graphium* sp. was evaluated as a biocatalyst for the production of tricin from wheat straw
- Experiments indicated the enzyme is a new oxidase and releases p-coumaric acid, vanillic acid as well as tricin from wheat straw
- Results have contributed to a publication describing this new ligninase

University of York

novozymes

High Value Biorenewables

Proof of Concept

Biotechnology and Biological Sciences Research Council

Producing hyaluronic acid in Acetobacter species

Tom Ellis & Vivianne Goosens, Imperial College London & Ben Reeve, Puraffinity / Modern Synthesis

- Hyaluronic acid (HA) is a polysaccharide widely used in medical and cosmetic applications
- *Acetobacter* offer great potential as a toxin-free vegan HA-production platform
- High value, polysaccharide HA was produced at significant concentrations by *Acetobacter* species from simple sugar sources
- A new company, Modern Synthesis, founded by the industry partner are in a good position to use the tools and techniques developed in the project and license related IP

Imperial College London

modern synthesis

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Business Interaction Vouchers

Biotechnology and Biological Sciences Research Council

Development of high-value functional food supplements from an algal biorefinery

Jeff Pearson, Newcastle University & Donal McGee, AlgaeCytes Ltd

- Algaecytes refine high-value metabolites from microalgae
- The majority of these microalgal metabolites are yet to be fully evaluated for their efficacy, bioavailability and toxicology
- A comprehensive data report on bioactives and immunomodulatory properties was delivered
- Bioactive effects including enzyme inhibition and promotion of anti-inflammatory cytokines were observed, suggesting potential use in weight management and control of inflammation

Newcastle University

algaecytes®

High Value Biorenewables

Business Interaction Vouchers

Biotechnology and Biological Sciences Research Council

Development of a cell-free biosynthesis strategy for high-value natural products

Simon Moore, University of Kent & Matthew Hodges, Oxford Biotrans

"This BIV has provided timely funding to support our early stage research into cell-free systems"
Simon Moore, University of Kent

- Using cell-free systems to engineer enzymes/ pathways towards high-value chemicals, linking biosynthetic genes to chemistry
- Advantages: HT screening, high reproducibility, resistance to toxicity and high product titres
- Outputs: reconstituted a six-step enzyme pathway towards making an important cofactor in a cell-free system
- Further work aims to link multiple biosynthetic pathways within an all cell-free environment

University of Kent

OXFORD BIOTRANS

High Value Biorenewables

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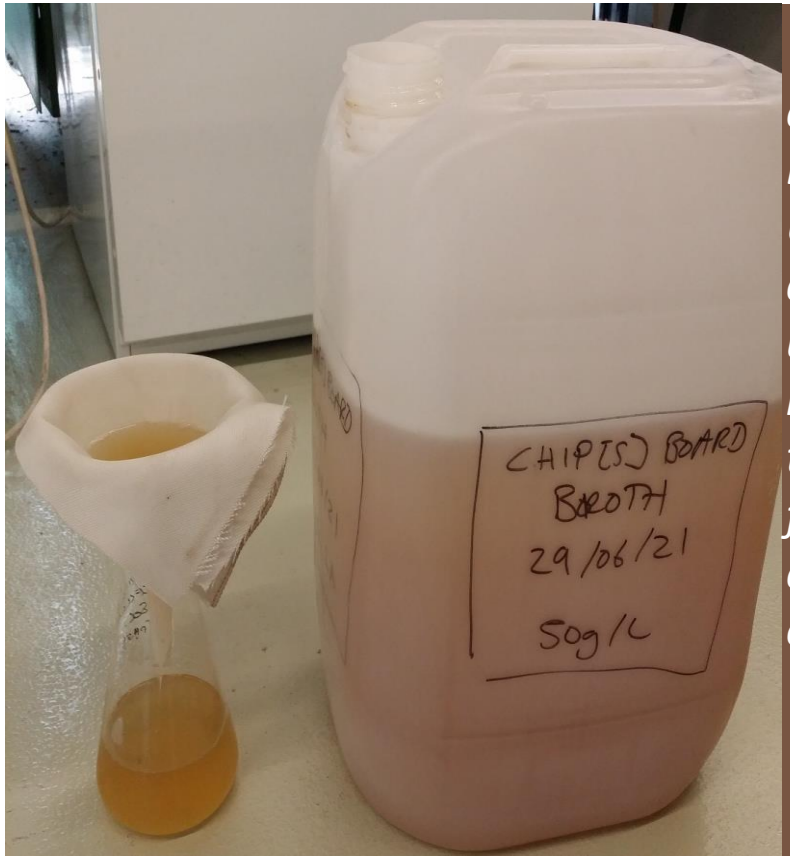
Biotechnology and Biological Sciences Research Council

Extracting value from agri-food waste using membrane technology

Diganta Das, Loughborough University & Joel Hardingham, Chip[s] Board



"HVB has provided an excellent opportunity for Chip[s] Board and Loughborough University to strengthen their collaboration. This has opened up a range of opportunities to investigate membrane technologies for DSP of fermentation broth through the extraction of highly purified organic acids."

Diganta Das,
Loughborough University

- Chip[s] Board produces bioplastics
- Aim to investigate combining ultrafiltration and nanofiltration membrane for a sustainable separation of lactic acid from fermentation broth
- A comprehensive review, primary data report on the utility of ultrafiltration and nanofiltration membranes, and technoeconomic costing were completed
- Identified potential in membrane technology to extract value from agri-food waste, pending a more detailed future project

Loughborough University

Chip[s] Board®

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UKRI Biotechnology and Biological Sciences Research Council

Purification and characterisation of sophorolipids using supercritical CO_2

Rob Elias, Bangor University & James Winterburn, Holiferm

"As an innovative and ambitious company BIV funding has helped us to explore the potential of our biosurfactant process. This approach helps to reduce uncertainty and lower future investment risk -a great example of how to collaborate!"

James Winterburn, Holiferm

- Sophorolipids - biosurfactants produced by yeast fermentation, can replace both petrochemical derived surfactants and the use of palm kernel oil
- Yeast fermentation produces complex mixtures of sophorolipids, these need to be characterised
- A method was developed for analysis of sophorolipids using LC-HRAM-MS
- Fractions were collected from sub-/super-critical CO_2 separation technique
- Fermentation conditions were optimised using these techniques

Prifysgol Bangor University

holiferm