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WORKSHOP PROGRAMME

29 August 2008 • Royal Society, London

Registration

Marble Hall
11:00am

Introductory Presentations

Kohn Centre

- 11.30 – 11.45 Welcome and Introduction
Peter Fryer, IBTI Club Steering Group Chair, BBSRC Council
- 11.45 – 12.00 Overview of research challenges
Robert Edwards, IBTI Club Steering Group, Durham University

Lunch and Networking

Marble Hall
12.00 – 13.00

Presentations highlighting the research challenges from an industrial perspective

Kohn Centre

- 13.00 – 13.20 Challenges in Optimisation of Feedstock Composition
Ray Elliott, IBTI Club Steering Group, Syngenta
- 13.20 – 13.40 Integrative Bioprocessing
Kris Wadrop, Green Biologics
- 13.40 – 14.00 Enhancing Product Value
Han Bevinakatti, IBTI Club Steering Group, Croda Enterprises
- 14.00 – 14.45 Question time
Panel: Peter Fryer
Robert Edwards
Ray Elliott
Kris Wadrop
Han Bevinakatti
Wolfgang Skibar
Chris Knowles

Meeting Close

14.45

AIMS

The overall aim of this workshop is to promote the first call for research proposals from the Integrated Biorefining Technologies Initiative (IBTI) Club. The workshop is targeted at researchers and will outline the first call for proposals to the IBTI Club, the research challenges to be addressed and provide an industrial context to these challenges.

Networking

There will be opportunities for networking and you should take the opportunity to make new contacts and exchange ideas with the potential of forming new collaborations for applications to the IBTI Club. BBSRC staff and Club Coordinators, Chris Knowles and Wolfgang Skibar, will be available throughout the day to answer any questions you may have regarding the IBTI Club.

Question Time

There is a session of the workshop scheduled as “Question Time” and you will have the opportunity to question members of the Steering Group and BBSRC about IBTI. The Question Time Panel members are:

Peter Fryer – IBTI Club Steering Group Chair, BBSRC Council

Robert Edwards – School of Biological & Biomedical Sciences, Durham University

Ray Elliott – Syngenta

Kris Wadrop – Green Biologics

Han Bevinakatti – Croda Enterprises

Wolfgang Skibar – IBTI Club Industrial Coordinator, Bioscience for Business

Chris Knowles – IBTI Club Academic Coordinator, Oxford Innovation

IBTI Club Webinar

If you would like to get more information on the IBTI call or one of your colleagues is interested in it but did miss this workshop, you or your colleagues can attend the Bioscience for Business online seminar:

Integrated Biorefinery Technologies Initiative Research and Technology Club (IBTI Club)

How to apply for funding

Friday 5th September 2008 – 15.00 (UK time)

This is one of a series of online-seminars, known as webinars, which are organised by Bioscience for Business to bring presentations live to your PC.

Webinars bring technical developments, commercial offerings and governmental initiatives in bioscience directly to your PC. They are completely free and will allow networking with people with the same interests. There is no need to travel. You can attend them directly from your computer.

If you would like to attend or want more information, please contact:

Wolfgang Skibar (Industrial Coordinator)

Tel: 01513 472919

wolfgang.skibar@biosciencektn.co

BACKGROUND TO THE INTEGRATED BIOREFINING TECHNOLOGIES INITIATIVE (IBTI) RESEARCH & TECHNOLOGY CLUB

Research underpinning the development of biological processes for the production of chemicals, materials and polymers to replace petro-chemical derived sources has been identified as an area where increased investment in research is required to underpin the needs of industry. To meet this need BBSRC has launched a Research and Technology Club in partnership with industry and the Bioscience for Business Knowledge Transfer Network (KTN). The Club will interface with the KTN's wider Integrated Biorefining Technologies Initiative (IBTI) and will invest around £5M (BBSRC £4M, Industry £730K) in industrially relevant, innovative, basic biological research in biorefining technologies. The initiative will run for 5 years and will have 2 calls for proposals.

The Club will provide a means to combine relevant academic expertise to work on innovative, multidisciplinary, scientific areas of relevance to industry. An integral feature of the Club's operation will be the delivery of efficient mechanisms to facilitate the dissemination of research outcomes to Club members and support effective networking and community building between academic groups and the companies involved.

CLUB MEMBERSHIP

The Club, which currently has 10 Industrial Members, will support research projects from a fund, joint with the BBSRC, of just under £5M. Industrial Members make annual contributions to the funding pot based on corporate size and between them will contribute £730K. BBSRC will invest up to £4M.

Organisations that have agreed to join the IBTI Club as of 29 August 2008 are:

Biocaldol Ltd
BP Biofuels UK Ltd
British Sugar Plc
Croda Enterprises Ltd
Danisco A/S Genencor
Green Biologics Ltd
HGCA
KWS UK Ltd
Syngenta Ltd
TMO Renewables Ltd

Researchers receiving IBTI Club funding will become Academic Club members.

IBTI CLUB STEERING GROUP

A Steering Group made up of 6 Research Council nominees, 6 members nominated by Industrial Club Members and Chaired by Peter Fryer of BBSRC Council has been established for the IBTI Club. The role of the IBTI Club Steering Group is primarily to establish the nature of research to be funded in the two IBTI Club calls for proposals and to peer-review applications submitted.

The IBTI Club Steering Group Membership is as follows:

Industrial Members

H.S. Bevinakatti, Croda
Colin Bird, BP
Ray Elliott, Syngenta
Jason Robinson, TMO Renewables Ltd
Richard Safford, HGCA
Chris Tapsell, KWS

Academic Members

Tony Bridgwater, Aston University
Mike Bushell, University of Surrey
Rob Edwards, Durham University
Simon McQueen-Mason, University of York
Jonathan Napier, Rothamsted Research
Gill Stephens, University of Manchester

CLUB MANAGEMENT

The Knowledge Transfer Network entitled Bioscience for Business (KTN) operating as part of the University of York is coordinating the Integrated Biorefining Technologies Initiative (IBTI) to establish a strategic initiative in biorefining technologies. The aim of the IBTI is to establish programmes of strategic problem-solving research focussed on diverse raw material feedstocks and the essential conversion technologies necessary to realise their economic potential.

As part of the delivery of BBSRC's Technology Strategy Underpinning Industrial Needs, BBSRC invited the KTN to identify industrially relevant research challenges and interested companies that could form the basis of a Research & Technology Club. As a result of this, BBSRC has agreed to make available funding for underpinning basic research on biorefining technologies within its remit through the establishment of the IBTI Research & Technology Club (the "Club").

Management of the peer-review of applications submitted to the IBTI Club is provided by BBSRC. The assessment of applications is performed by the IBTI Club Steering Group, who rank applications based on science quality and industrial relevance, and make funding recommendations to the BBSRC.

The IBTI Club will operate for 5 years, supporting research through two calls for proposals. The Club will be managed by BBSRC, and research projects will be awarded as BBSRC grants using peer review processes as for fully public funded research. The management of the peer review of applications submitted to the Club will be performed by BBSRC.

BBSRC has appointed an Academic Coordinator (Chris Knowles, Oxford innovation) and an Industrial Coordinator (Wolfgang Skibar, Bioscience for Business). Chris will work with the academic community in the development of project proposals and monitor progress of funded projects. Wolfgang will work with company members to canvass views, promote Club activities, and keep industry members informed of developments. Chris and Wolfgang will work together to facilitate networking between the funded research groups and industry and ensure the success of the club.

FIRST CALL FOR RESEARCH PROPOSALS SUPPORTED BY THE IBTI CLUB

Research themes

Biorefining can be defined as the fractionation and processing of renewable biomass feedstocks for industrial applications. Drawing parallels with refining fossil oils, biorefineries will have to be highly efficient, produce minimal waste streams and allow the fractionation of raw materials and recovery of multiple products. Ideally they will be able to produce as wide a range of bulk and high value chemical products as is currently available from petrochemical feedstocks. In terms of bulk supply, these feedstocks will be primarily derived from terrestrial and marine plants, as these are responsible for photosynthetic primary productivity and carbon fixation in these environments.

The development of biorefining into commercially viable and sustainable industrial processes is clearly a major undertaking, which will require interdisciplinary research encompassing the biological and physical sciences interface. With this in mind, three research themes have been identified for the Club.

- **Optimisation of feedstock composition**
- **Integrative bio-processing**
- **Enhancing product value**

While it is recognised the current focus on biorefining as an adjunct to biofuel production, the diversification of products derived from renewables could radically change this paradigm in the near future. The initiative therefore takes a broad view as to the types of desirable outputs obtainable from biorefining. For example the following products have all been identified as potentially useful outputs of future refining processes in addition to saccharides.

- Speciality oils varying in carbon chain length, desaturation and substitution
- Surfactants
- Polymers, oligomers and their monomeric precursors
- Heteroaromatic and pseudoaromatic compounds
- Flavours and nutraceuticals
- Terpenoids
- Cosmeceuticals, essential oils, vitamins
- Phytopharmaceuticals

While this list is not exhaustive it does illustrate the broadness in scope of the initiative. For illustration, examples of contemporary biorefining processes such as sugar beet refining (www.britishsugar.co.uk/RVE40edc82500474ddc933380156daa796c...aspx) and maize ethanol production (www.ethanol.org/index.php?id=73&parentid=73) may be useful.

Optimisation of feedstock composition

Plant and algal biomass are heterogeneous materials from which a range of products may be derived by extraction and conversion. Sustainable biorefining requires that value be obtained from as much of the biomass as possible and while this requires efficient extraction and conversion technologies (see Integrative bio-processing and Enhancing product value below), it is also important that feedstock quality is optimised. Traits to be developed include increasing the yield of valuable components and the ease with which these components can be extracted and processed. Plant materials to be targeted include biomass crops, or agricultural residues,

for use in the bulk production of biochemicals and materials such as sugars, oils, fibres, liquid fuels or biogas. In addition, the application of biorefining will mean a range of high value products (speciality fine chemicals, bioactive compounds) are also potentially recoverable as minority by-products from plant or algal feedstocks. The range and quantity of both bulk and speciality products will be extended by manipulating the metabolism of feedstock plants through marker-assisted breeding, genetic engineering or a combination of both.

This theme therefore calls for research aimed at manipulating the metabolism of established and emerging crops, including those currently grown in the UK, to improve plant biomass for applications in biorefining.

Examples of areas of potential interest include:

- enhancing and modifying natural products derived from either primary or secondary metabolism which are currently minor molecular entities;
- making agricultural residues more energy dense to reduce transport costs and facilitate the sustainability of the supply chain;
- changing the biochemistry of plant feedstocks to facilitate down-stream processing, for example by targeting the composition of cell wall components to improve the ease of saccharification and extraction;
- monitoring changes in quality traits associated with these new feedstocks using high throughput analytical methods.

Integrative bio-processing

Biorefining will require the development of more efficient and intense microbial bioprocesses, which can be integrated both with separation technologies and with further chemical transformations. The great advantage of microbial processes is the ability to resolve all the available carbon sources and substrates in complex feedstocks to relatively small numbers of synthetically useful building blocks. Therefore, one of the most important targets for the potential user community will be met from studies which seek to promote a high degree of substrate utilization from a real or artificially constituted biorefinery feedstock, with specific substrate consumption rates, as important engineering targets. A desirable deliverable from the IBTI programme would be the provision of transferable knowledge in terms of genes and corresponding enzymatic activities, able to effect efficient substrate conversion. This is an area of potentially high scientific impact (e.g. Nature, 2008, **451**, 86-89) as well as providing information of significant strategic and economic value.

The most sustainable feedstock is likely to be lignocellulosic materials derived from biomass (agricultural residues or bioenergy crops) as these substrates represent the most abundant sources of organic carbon on the planet. However, extracting all the valuable monosaccharides from these materials is problematic as chemical approaches have an environmental consequence and result in the loss of some of these monomers. Biological approaches are currently hampered by limited substrate access to enzyme attack and the complexity of the chemical linkages between the components of the composite structures. It will therefore be important to combine modern chemical bio-separation technologies with advanced enzyme engineering technologies designed to solve the “access problem”.

Examples of areas of potential interest in microbial bioprocessing of plant materials include:

- genome scale metabolic engineering and fluxomics;
- engineered product toxicity resistance;
- integration of product/feedstock on-line detection into process design;
- development of appropriate tailored enzyme consortia to generate the monomeric substrates from complex feedstocks for industrial fermentations.

Resolution of the bottlenecks in this area of bioprocessing will require research at the interface between chemistry, enzymology and the physical barriers to biological processes and research groups are expected to be highly multidisciplinary. Research projects based on a combination of applying both chemical and bioprocessing technologies would therefore also be welcomed, particularly those able to resolve complex cocktails of bioproducts into individual classes for recovery and purification. Examples of potential interfacial areas to be developed within this theme include:

- reactor design and large scale separation methodologies;
- sustainability in input requirements.

Enhancing product value

While it will be possible to directly tailor many products from biorefining for subsequent use in industrial applications, it is also recognised that major by-products may be of limited economic value. The processing of these bulk by-products into new higher value chemical entities with alternative applications is an immediate challenge for the successful implementation of biorefining. Areas of interest include the use of novel chemical and bioprocessing as well as fractionation methods to recover high-value products.

Allied to biofuel production, a topical example is the recovery of useful molecules from ethanol fermentation residues. This represents a considerable biological and chemical challenge with the residues composed primarily of lignin, which is highly recalcitrant to biological conversion to useful monomeric species. To unlock the industrially useful organic entities in these polymers will require the development of enzyme and chemically mediated free-radical reactions to open the aromatic rings to yield molecules that can be used as fermentation feedstocks. Similarly, in other industries such as sugar refining and paper production current by-product streams contain potentially useful chemical feedstocks. Unlocking the economic potential of these chemical intermediates requires specific bioprocessing and/or chemical conversion. In an alternative strategy, biotransformations of low-value products into fine chemicals represents a further mechanism for adding value to biorefining.

Examples of potential projects in this area include:

- metabolic engineering of industrially useful microbes to degrade lignin;
- the use of fermentation or biocatalysis to transform other by-products derived from biofuel production into useful chemicals;
- enhancement of the value of existing products through selective biotransformation or sustainable chemical processing.

GUIDELINES FOR CALL

- The objectives of the research proposed must fit with the scientific challenges detailed in the 'IBTI Club research themes' document and the science proposed must fall within the remit of BBSRC.
- Research proposals are sought for funding for up to 5 years.
- Outline proposals must be submitted in the first instance.
- It is likely that the aims of the IBTI Club can best be achieved by an interdisciplinary approach. Collaborative applications which bring together groups with relevant expertise are therefore particularly encouraged.

CRITERIA FOR ASSESSMENT

The prime criterion for assessment is the quality of science proposed, however particular emphasis is also placed on the strategic relevance to the IBTI Club. It is expected that any proposal that goes on to be funded through the Club is competitive against comparable international work and will demonstrate strategic relevance to the Clubs aims. Proposals will be assessed against the following criteria:

- Scientific excellence
- Industrial and stakeholder relevance
- Relevance to IBTI Club strategy
- Economic and Social impact
- Timeliness and promise
- Cost effectiveness and,
- Staff training potential of the project (where resources are requested for postdoctoral or other research staff)

SPECIAL CONDITIONS

Recognising the financial support for the programme from industrial members of the Club, it should be noted that special conditions will be attached to any research grants as follows:

Grant holders must

- Give at least 28 days notice of an intention to publish, outside of the Club, results from research funded by a Club grant. The material for proposed publication should be submitted to the Industrial Coordinator along with the notice of intent to publish. The Coordinator will distribute a copy of the same to each of the Commercial Parties who shall have fourteen (14) days from receipt of such copy to inform the Coordinator if in their view the proposed publication may (i) dilute or prejudice the value of proprietary information of a Commercial Party or (ii) jeopardise the application for Resulting IPR protection or (iii) otherwise inhibit future exploitation of the results and whether a Commercial Party has an interest in exploiting those results.
- Produce annual progress reports. A form will be available on the website for Grant Holder to complete and Grant Holder will be notified in advance when the final report will be due.
- Engage in club activities including attending and presenting the results and progress of Club funded research at 6-monthly club dissemination events. Grant holders will be notified of the dates and format of their presentation.

- Give advance notification of any opportunities to exploit intellectual property arising from their grant to the commercial parties.

APPLICATIONS PROCEDURE

There is a 2-stage application process:

- Outline proposals must be submitted on the Outline Application Form as a **Word document** sent to ibticlub@bbsrc.ac.uk. The closing date for outline applications is **15 October 2008, 4pm**.
- Special conditions will be attached to research grants awarded through the Club. A letter from the institutions technology transfer office or equivalent, acknowledging that the institution is able to accept those conditions relating to IP, must be submitted alongside the application.
- Successful applicants will be invited to write a full application in November 2008 for submission by mid-January 2009 (dates to be confirmed).

ASSESSMENT

Outline applications will be assessed by the IBTI Club Steering Group and will not be externally reviewed. Full applications will be externally peer reviewed prior to final assessment by the IBTI Club Steering Group. The decision to fund full applications will be announced in April 2009.

ELIGIBILITY

UK Higher Education Institutions, Independent Research Organisations and BBSRC-sponsored institutes are eligible to apply.

CONTACTS

For further information contact:

IBTI Club Programme Manager

Kristine Cherry
Business and Innovations Unit
Polaris House
North Star Avenue
Swindon SN2 1UH
Tel: 01793 413253
Email: Kristine.Cherry@bbsrc.ac.uk

IBTI Club Academic Coordinator

Chris Knowles
chrisjknowles@btinternet.com

IBTI Club Industrial Coordinator

Wolfgang Skibar
wolfgang.skibar@biosciencektn.co

Integrated Biorefinery Technologies Initiative Research and Technology Club

Outline Application

For Office Use Only
ID:
Evaluation:

(1)	Date: / /												
(2)	Principal Investigator (co-investigators to be listed in 11)												
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(3)	Title of research proposal (not to exceed 100 characters including spaces):												
(4)	Research Theme (refer to one or more of the themes outlined in the research themes document):												
(5)	Description of research proposal (not to exceed 500 characters including spaces)												
(6)	Amount requested: £												

(7)	Industrial Collaborators (if applicable):	
(8)	Proposed starting date:	Proposed duration (in months):
(9)	Number of hours a week principal investigator proposes to spend on the research project:	
(10)	Number of co-investigators:	
(11)	Names, titles, positions and institutions of co-investigators:	
(12)	Four nominated referees (for use if full application invited):	
	Name:	Name:
	Position (if applicable):	Position (if applicable):
	Full address:	Full address:
	Name:	Name:
	Position (if applicable):	Position (if applicable):
	Full address:	Full address:

(13)	Please explain how your research proposal fits the remit of the IBTI Club (not to exceed 500 characters including spaces):
(14)	Summary of proposed research (not to exceed 12000 characters including spaces):

IBTI CLUB MEMBERS & COMPANY INFORMATION

Biotechnology and Biological Sciences Research Council (BBSRC)
Bioscience for Business Knowledge Transfer Network
Biocaldol Ltd
BP Biofuels UK Ltd
British Sugar Plc
Croda Enterprises Ltd
Danisco A/S Genencor
Green Biologics Ltd
HGCA
KWS UK Ltd
Syngenta Ltd
TMO Renewables Ltd

Biotechnology and Biological Sciences Research Council (BBSRC)

BBSRC is the UK's principal funder of basic and strategic biological research. To deliver its mission, BBSRC supports research and research training in universities and research centres throughout the UK, including BBSRC -sponsored institutes; and promotes knowledge transfer from research to applications in business, industry and policy, and public engagement in the biosciences.

BBSRC is a non-departmental public body, supported through the Science Budget by the Department of Trade and Industry via the Office of Science and Innovation. BBSRC works with partner Research Councils through Research Councils UK.

Website: www.bbsrc.ac.uk

Bioscience for Business Knowledge Transfer Network

Bioscience for Business is a Government-funded Knowledge Transfer Network designed to accelerate the rate of technology transfer into UK business and improve innovation performance. Bioscience for Business focuses on industrial bioscience - nature's solutions to benefit society - providing unique connections between white (industrial), green (plant) and blue (marine and freshwater) bioscience sectors. Bioscience for Business is the most important conduit for bio-based technology business to engage with government, other business, research and trade organisations.

The move towards a bio-based economy requires the use of renewable feedstocks for the production of chemicals, materials, energy and fuels. The supply chains required for production, extraction, purification and transformation of these biologically-source renewable materials are served by the Bioscience for Business KTN. The diverse components of research, development and demonstration required for effective exploitation of natural materials in this new economy are strategically unified by several complementary KTN-led initiatives aimed at securing a long-term competitive advantage for UK industry.

Website: www.biosciencektn.com

Biocaldol Ltd

Biocaldol Ltd. specialises in developing turnkey solutions designed to transform the agro-industry. These solutions comprise proprietary, environmentally-friendly micro-organisms, custom-made process design and engineering for the production of second-generation biofuels, animal feed and other biomass-derived products.

The current focus of Biocaldol business is system integration. Biocaldol works closely with customers and agro-industrial partners to retrofit conventional ethanol plants, develop process components, provide engineering expertise and gain marketing access within the key market sectors.

Website: www.biocaldol.com

BP Biofuels UK Ltd

BP is one of the world's largest energy companies, providing its customers with fuel for transportation, energy for heat and light, retail services and petrochemicals products for everyday items. It is the largest oil and gas producer in the U.S. and one of the largest refiners. BP also has a global network of around 25,000 service stations.

BP is a leading player in the global biofuels market. In the US, BP blended and distributed 763 million US gallons of ethanol and about 1 million US gallons of biodiesel during 2007. In Europe, BP sold 344 million litres of ethanol and 847 million litres of biodiesel during 2007. BP's sales of biofuels in 2007 accounted for about 10% of the global biofuels market.

Website: www.bp.com/biofuels

British Sugar Plc

British Sugar is the leading supplier of sugar to the UK market, producing more than 1 million tonnes of white sugar each year from beet. Our products are represented in the leading brands of all of the major global food and drink manufacturers. Processing more than 7 million tonnes of sugar beet also results in a range of additional products for other markets, like agriculture, salad crops, landscaping, soil improvement and biofuels.

As one of the UK's leading agriprocessors with an interest in innovative new technology, British Sugar began production of bioethanol in September 2007 making it the first company to manufacture bioethanol in the UK. British Sugar is able to supply bioethanol with full traceability including a full life cycle analysis. This is necessary to demonstrate that the whole process of production, including crop growing, fermentation and distribution, is carried out in such a way that genuine environmental benefits are delivered.

Website: www.britishsugar.co.uk

Croda Enterprises Ltd

Croda is a world leader in natural based speciality chemicals which are sold to virtually every type of industry. The company has approximately 4000 employees, working at 43 sites in 36 countries. Our activities can be broadly classified into two sectors: Consumer Care which consists of global businesses in personal care, health care, home care and crop care – all markets with an increasing need for innovation and sustainable ingredients; and Industrial Specialities which comprises base oleochemicals, additives for polymers, polymers and coatings, lubricants and lubricant additives, and processed vegetable oils.

Croda employs a variety of 'traditional' chemical processes to convert natural based raw materials (mainly vegetable oils and fats such as rapeseed, coconut and palm oils) into fatty acids and glycerol, and then further refine and process them into a range of functional specialities. In addition, however, Croda has developed its own technologies. With technical centres strategically located worldwide, our technologists work closely together, sharing ideas and information, to ensure that Croda is always at the leading edge of new technology in all its chosen markets.

Website: www.croda.com

Danisco A/S Genencor

Danisco is a world leader in food ingredients, enzymes and bio-based solutions. Based on our technology platform we use nature's own raw materials and resources to develop and produce ingredients for food and other products used in everyday life. Our ingredients are used in about every second ice cream and cheese, every third box of detergent and every fourth loaf of bread produced globally. Danisco ingredients based on food technology and biotechnology are also used in other consumer products – from detergents and toothpaste to biofuel, plastics and feed.

Throughout the value chain, sustainability is integrated in Danisco's way of doing business. We believe that sustainability creates long term value on an economic, social and environmental basis. Being a knowledge based business, Danisco gives high priority to innovation, research and development. Based on our technology, we constantly strive to expand the use of our products for the benefit of existing and new markets.

Website: www.danisco.com

Green Biologics Ltd

Green Biologics Limited (GBL) is an industrial bio-technology SME, based near Oxford, pioneering advanced microbial technologies for the conversion of sugars to renewable chemicals and fuels. More specifically, GBL is a world leader in Clostridial ABE (Acetone-Butanol-Ethanol) fermentation and supplies advanced bio- butanol process solutions to large feedstock owners and chemical producers. The company is currently working with a number of feedstock partners across three continents to pilot and demonstrate its proprietary process.

Website: www.greenbiologics.com

HGCA

Mission: To improve continuously the production, wholesomeness and marketing of UK cereals and oilseeds so as to increase their competitiveness in UK and overseas markets in a sustainable manner.

Our Role: HGCA provides high quality cost-effective services, designed to meet the needs of levy payers, whilst taking account of both consumer and environmental requirements. Working closely with levy payers to ensure that there is an effective exchange of knowledge and understanding along the grain chain, HGCA generates and disseminates independent information to help support a competitive and sustainable arable industry.

Website: www.hgca.com

KWS UK Ltd

KWS UK is a leading provider of agricultural seeds (cereals, oil-seeds, sugar beet and maize) dedicated to providing UK growers with innovative new varieties to meet increasingly demanding end-market needs. It is part of the KWS Group which operates in 65 countries, has a turnover of 537million euros and a staff of 2,700.

KWS is a leading seed company in the bio-energy area with dedicated breeding programmes for Bio-energy Maize and Sorghum and numerous R&D links with academics across Europe.

Website: www.kws-uk.com

Syngenta Ltd

Syngenta is a world-leading agribusiness. We are committed to sustainable agriculture – farming with future generations in mind. We contribute to that in many ways, for example by raising productivity through innovative research and new technology. Our company provides two main types of products: seeds and crop protection. Syngenta helps growers around the world increase their productivity and address the world's growing demand for food, feed and fuel.

Syngenta was created in 2000. Syngenta is a leader in crop protection, and ranks third in the high-value commercial seeds market. Sales in 2007 were approximately \$9.2 billion. The company employs over 21,000 people in more than 90 countries. Our experience with plants goes back many decades. All around the world, our scientists work with a vast range of crops in local conditions, and share their insights globally. Bringing plant potential to life is our company purpose.

Website: www.syngenta.com

TMO Renewables Ltd

TMO Renewables Ltd was founded in 2002, TMO Renewables Ltd has developed a technology which is described as “the sponsor of a paradigm shift in the production of ethanol from biomass”. At the core of TMO's offering is an ethanologen, developed in their laboratories, which is performing today at the levels set by the US Department of Energy for targets to be reached in 2011. This thermophilic organism operates at high temperatures and digests a wide range of feedstocks very rapidly. TMO has developed a process which exploits these properties to make ethanol from cellulosic biomass in a manner which eliminates the economic barriers that have restricted the development of cellulosic ethanol production.

TMO has built and is currently operating their Process Demonstration Unit (PDU) which is designed to handle a wide variety of feedstocks including wheat straw, corn stover, corn fibre, wood chips, switchgrass, distillers grains etc. It was designed for the upmost flexibility and includes TMO's bespoke design for pretreatment, enzyme hydrolysis and fermentation working in batch or fully continuous mode.

TMO intends to offer this second generation technology in the first instance to the existing corn ethanol sector. By “bolting on” a TMO designed facility at an existing corn ethanol plant, the distillers dried grains and soluble (“DDGs”) that arise as a co-product can be further processed into additional ethanol. This will deliver significant energy savings to the plant owner by eliminating much of the DDGs drying requirement: the TMO process requires a wet feedstock. After the cost of corn, drying costs represent the second largest element of the cost of production in corn ethanol. The impact of a twelve to fifteen percent increase in ethanol production from the cellulosic co-product when combined with the existing starch derived ethanol results in a significant margin increase for the producer.

Website: www.tmo-group.com

DELEGATE LIST

Guy Barker

Warwick HRI, University of Warwick

Current Role & Research Activities: Warwick HRI aims to exploit plants as sources of energy and to develop biorefining technologies from plant material to provide sustainable resources for the future. We aim to optimise crops for specific industrial purposes such as plant oils for production of plastics, bio-lubricants, paints, and increasing the energy efficiency of biofuel. Research is interdisciplinary and involves collaborations within the University as well as in the wider scientific community. I am Director of the Genomics Resource Centre in Warwick HRI. I currently have funding from BBSRC in the area of crop science and genome sequencing and from EPSRC on the adaptability of feedstocks from EPSRC (Programme 1). I have a strong interest in the development of biorefineries and have received funding to investigate utilisation of species biodiversity for the production of new varieties of brassica to produce oils in the UK for use as a feedstock to replace mineral oil and as an alternative crop for production of compounds for industrial use. I am part of a strong interdisciplinary team involving Chemistry and WMG looking at plastic production from plant based oils and a participant in both VOPNet. My other research interests include developing a novel approach for the recovery of bio-energy from ligno-cellulolytic waste, exploring the genes and mechanisms underlying fatty acid quality and utilising diversity within the gene pool to understand gene expression and regulation of biodiversity. I am part of the CIKTN academic advisory board and a participant in the IB-IGT Technology and manufacturing working group.

Harry A. Barnett

Research & Business Services, The InCrops Project, University of East Anglia

Current Role & Research Activities: Acting Administrator to The InCrops Project. The InCrops Project is a partnership project that is designed specifically to: stimulate the commercialisation of alternative and non-food crops and products through new business activity, build on the East of England's world class research capability, facilitate supply chain development, market integration and product innovation to support the business and commercial sector and stimulate sustainable economic growth. This initiative includes accessing pre-commercial research, market intelligence, market development and product development; crop development and agronomy;

knowledge exploitation and transfer; commercial liaison, supply chain development and grower support. Capacity building will cover the key themes of: Plants for Industry, Plants for Health and Well Being, Plants and Climate Change. The InCrops Project addresses the need for innovation in: use of plant derived renewable and natural products in key sectors, stimulation of the rural economy through high value enterprises, promotion of carbon reduction and climate change improvement.

Naz Bashir

Biocaldol

Han Bevinakatti

IBTI Club Steering Group Member
Croda Enterprises

Kerry Burton

Warwick HRI, University of Warwick

Current Role & Research Activities: Senior Research Scientist. Interests include: Biorefining wheat straw for chemical production, Fungal morphogenesis sing molecular genetics, Charactering virus response genes, Pharmaceutical production in fungi

Adam Charlton

Welsh Institute for Natural Resources, Bangor University

Current Role & Research Activities: The focus is on the use of natural materials for use in industrial applications. and all the centre's research projects are collaborative with industry and often as well involve other Universities with complementary expertise. Recent and current work has used vegetable oils, starches and grasses as starting materials. Vegetable oils have been used to develop new plasticizers, stabilisers and resins. Starches and cellulosic fibres have provided the polymers for a range of packaging films and trays. We are currently working with industrial partners to derive platform chemicals from an agricultural crop. Technical capability comprises fibre handling, materials processing, chemical synthesis, characterisation and scale up.

Kristine Cherry

IBTI Club Programme Manager

Business Interface Programme Manager,
BBSRC

Andy Cureton

Business Interaction Manager, BBSRC

Steve Donegan

Advanced Processing, The Centre for Process Innovation

Current Role & Research Activities: Process Technology Manager for the Centre for Process Innovation Advanced Processing Platform. Presently interested in the development of fuels and platform chemicals from renewable materials with specific interest in the Process Technology.

Matthew Davidson

Chemistry, University of Bath

Head of inorganic chemistry group, Director of Centre of Sustainable Chemical Technologies. Research in sustainable catalysis and chemical applications of renewables.

Daniel Eastwood

Warwick HRI, University of Warwick

Current Role & Research Activities: Senior Research Fellow at the University of Warwick currently carrying out research into: Biorefinery of straw, microbial lignocellulose, microbial fermentation, molecular microbiology.

Rob Edwards

IBTI Club Steering Group Member

Bioactive Chemistry, Durham University

Current Role & Research Activities: Research interests plant secondary metabolism/ biotransformation/ metabolic engineering of bioactive plant products/ herbicide selectivity and crop protection

Ray Elliott

IBTI Club Steering Group Member

Analytical Development, Syngenta

Current Role & Research Activities: Strategic Projects Manager: I have extensive experience in R&D, embracing discovery, process and scale-up chemistry, environmental and dietary safety, analytical research and development, activities in non-food crops and science policy and communication, within Syngenta, As a consequence, I get involved in a wide range of internal and external activities in support of Syngenta's R&D.

Steven Fish

Institute of Biological Environmental and Rural Sciences, Aberystwyth University

Current Role & Research Activities: Plant breeding genetics and biochemistry of: Miscanthus, Ryegrass, Willow, Clover, Lupins

and Oats, and their use/ conversion into fuels, platform chemicals and higher value products.

Ian Fotheringham

Ingenza Ltd

Current Role & Research Activities: Generation of green technologies and processes that use engineered microorganisms and biocatalysts for the manufacture of products such as fine chemicals, chemical feedstocks, nutraceuticals and fuels. Ingenza uses high-tech molecular biology techniques (such as strain engineering and directed evolution) and high yielding defined media fed batch fermentation to produce chemical products, microorganisms and biocatalysts. Ingenza's chemical development team then uses the biological products in the generation of economic and scaleable bioprocesses.

Paul Fraser

Biochemistry, RHUL

Current Role & Research Activities: Research leader, production of useful isoprenoids from plant natural and microbial sources.

Peter Fryer

IBTI Club Steering Group Chair

University of Birmingham, BBSRC Council

Ian Garrard

Brunel Institute for Bioengineering, Brunel University

Current Role & Research Activities: Manager of the Advanced Bioprocessing Centre at Brunel University. This Centre conducts research into liquid-liquid chromatography for bioprocessing applications and engineering advances of the instruments used for this technology.

Paul Goddard

Centre of Excellence in Biocatalysis, Biotransformations and Biocatalytic Manufacture (CoEBio3)

Current Role & Research Activities: Formation of industrial/academic consortia to tackle fundamental and applied challenges in biorefining. Project management of contract research programmes for the energy and oil industries.

Claire Halpin

Division of Plant Sciences, College of Life Sciences, University of Dundee

Current Role & Research Activities: I am currently Professor of Plant Biology and Biotechnology within the Division of Plant Sciences, College of Life Sciences, University of

Dundee. My research labs are based at the near-by Scottish Crop Research Institute. There are several strands to my current research. The work that is most closely allied to the aims of the IBTI involves elucidating the biosynthesis of lignin including the isolation of the genes involved in its production. These same genes can then be manipulated in mutant or transgenic plants to modify cell wall structure/composition and improve plant materials for industrial and agricultural uses. A particular current focus of our research is to improve plant biomass for biofuel production. We work in a variety of model plant species and increasingly, in collaboration with the Genetics Division at SCRI, in barley, a major UK crop. A second strand of our research is to develop new and improved techniques, or enabling technologies, to broaden the possibilities for manipulating plant metabolism by transgenesis.

Patricia J. Harvey

Science, University of Greenwich

Current Role & Research Activities: Professor and Head of Bioenergy Research Group. Prime research concerns over the past 25 years have centred on bioenergy and the exploitation of lignocellulosic plant wastes as an energy-rich resource. Current research activities include the pre-treatment of plant lignocellulosic materials for use as biofuels - oil, gas, pellets - for CHP, the development of novel approaches for plant oil production, the use of bio-phytotechnologies for land contaminated with organic pollutants. Currently leading a consortium of 12 partners in Kent to develop a fully integrated approach for providing CHP based on renewable biofuels, and then roll out the blueprint for the approach across the UK. Also serving on the management committee of EU COST Action 859: Phytotechnologies to promote sustainable land use management and improve food chain safety.

Lisa Hearty

Biological and Chemical Sciences, Queen Mary University of London

Current Role & Research Activities: Looking at bioreactors to produce biological hydrogen and sustainable pharmaceuticals.

Tom Jenkins

Bioscience for Business KTN, University of York

Current Role & Research Activities: Renewable and Sustainable Technologies Manager. Interested in biorefining technologies and the project manager for the IBTI programme being coordinated by the Bioscience for Business KTN

Abbas Kazmi

Green Chemistry Centre of Excellence, University of York

Current Role & Research Activities: My role is to promote, manage and develop the SUSTOIL project. This involves working with 23 project partners in 10 EU countries and liaising with 25 advisory board members from the EU, USA and beyond. SUSTOIL is a major European project (FP7) and its aim is to develop advanced biorefinery schemes to convert whole EU oil-rich crops (rapeseed, olive and sunflower) into energy (fuels, power and heat) and food and bioproducts (chemicals and/or materials).

Christopher J. Knowles

IBTI Club Academic Coordinator

Oxford Innovation

Current Role & Research Activities: Advisor to the Environmental KTN. Formerly Professor of Environmental Science at the University of Oxford, with interest in microbial bioremediation and biocatalysis.

Antonios Kokossis

Faculty of Engineering and Physical Sciences, Chemical Engineering, University of Surrey

Current Role & Research Activities: Director, Process and Information Systems Engineering. Research areas: Process systems engineering, synthesis and optimization, modelling, simulation, decision support systems. Projects related to the topic: A Systems Platform for Substituting and Integrating Renewable Materials and Chemicals Manufacturing (with a cluster of process industries in the North East UK).

Prakash Korde

Valueform Ltd

Current Role & Research Activities: Managing Director. We have proven the material composites made from various cereal straws for packaging of food, horticulture and medical disposable items. The technology for processing has also been captured and machinery being installed in tech. Transfer site In Wales in UK. The process centres around vacuum moulding in which slurries are produced. Intent is to examine further uses of this. Have engaged biocomposites centre in Wales and Uni. of Reading as collaborators.

David Leak

Life Sciences, Imperial College London

Current Role & Research Activities: Group leader with specific interests in microbial

metabolic engineering and biocatalysis, with a particular focus on biofuels, chemicals from biomass and novel methods of biomass processing. As well as molecular biology and fermentation, we have recently created a biomass processing lab with facilities for high temperature and pressure biomass pre-treatment.

Karen Lewis

Head, Business and Innovation Unit, BBSRC

Jenny Littlechild

Biosciences, Biocatalysis Centre, University of Exeter

Current Role & Research Activities: Director of Exeter Biocatalysis Centre. Application of novel enzymes for use in biocatalysis. Application of these enzymes in integrated biorefinery processes to break down biomass and for the development of integrated processes for production of high value chemicals.

Robert Lovitt

Centre for Complex Fluids Processing, School of engineering, Swansea University

Current Role & Research Activities: The main interests of the group are the applications of membrane technology for the processing of biomass to obtain high value products. We have been involved in a series of projects related to the bio refining and this has involved the key operations of disruption and separation using micro-, ultra- and nano filtration and the generation of specialist integrated bioreactors: the enzyme hydrolysis of proteins and carbohydrates in membrane bioreactors, the growth and processing of algae, the extraction of vegetable, dyes from roots and leaves and biologically active compounds from tea, tomatoes and algae, the use membrane bioreactors for fermentation and maturation of alcoholic beverages, the disruption of microbes, plant and animal cells, the fractionation of microbes and plant cells using membrane technology, characterisation of the physical properties of biomaterials for bioprocess design.

Alan Marchant

School of Biological Sciences, University of Southampton

Current Role & Research Activities: I am a PI running a group researching into cell wall biosynthesis using both Arabidopsis and poplar model systems.

Michael McArthur

Molecular Microbiology, John Innes Centre and Procarta Biosystems Ltd.

Current Role & Research Activities: Developing *Streptomyces* as a host for heterologous production of enzymes and natural products; Tools for knowledge-based engineering for strain improvement DNA-based tools to define genetic regulatory pathways and manipulate them in bacteria

Radek Messias de Bragança

The BioComposites Centre, Bangor University

Current Role & Research Activities: Innovation Scientist involved in the development of programmes aimed to improved sustainability.

Jonathan Napier

IBTI Club Steering Group Member

Biological Chemistry, Rothamsted Research

Current Role & Research Activities: Metabolic engineering of plants for high value products.

Nick Oswald

Ingenza Ltd

Current Role & Research Activities: Generation of green technologies and processes that use engineered microorganisms and biocatalysts for the manufacture of products such as fine chemicals, chemical feedstocks, nutraceuticals and fuels. Ingenza uses high-tech molecular biology techniques (such as strain engineering and directed evolution) and high yielding defined media fed batch fermentation to produce chemical products, microorganisms and biocatalysts. Ingenza's chemical development team then uses the biological products in the generation of economic and scaleable bioprocesses.

David Pink

Warwick HRI, University of Warwick

Current Role & Research Activities: Prof David Pink has over 25 years experience in crop genetics and breeding research. He leads the Crop Improvement group at Warwick HRI and currently he leads a multidisciplinary research programme involving six research groups as well as joint projects with three breeding companies. His main research interest is the development of tools, resources and information to facilitate the improvement of quantitative traits of agronomic interest through the exploitation of natural allelic variation. Prof Pink has a rapidly developing research interest in industrial crops to understand and exploit natural allelic variation in traits of interest in order to produce plants with properties suited to different industrial end uses.

Much of this work is multidisciplinary and carried out in collaboration with engineers and chemists ensuring that it is aligned with end user requirements. He is a partner in an EPSRC funded multi centre collaborative project to develop an intensified and integrated biorefinery and a project to develop processes to produce compounds of value from plant waste funded through the EPSRC funded Warwick Innovative Manufacturing Research Centre. In addition he was recently involved in an EU funded project on interregional collaboration in utilising plant based materials as feedstocks for supply chains in the areas of bio energy, novel materials and health and wellbeing.

Sreenivas Rao Ravella

Air and Climate, North Wyke Research

Current Role & Research Activities: Fermentation Scientist, Air and Climate Team, North Wyke Research. UK and EU agro biogas to understand the processes that improves the microbial biogas production, modern process control tools for improving fermentation stability, optimize biomass composition and renewable bioenergy crops for improved conversion into bio energy. Co-investigator: (BBSRC UK-India Partnering award) Development of specific microbial consortia for the improvement of renewable bio-energy products in an Anglo-Indian partnership. Research interests mainly concern biofuels production, lignocellulosic hydrolysis, xylose fermentations, diversity of microorganisms from different habitats and extremophiles, fermentation optimizations using Taguchi Method, molecular characterization of yeasts, yeast diversity, exploiting novel microbial species to bio refineries like ethanol, xylitol, enzymes and other value added products.

Lars Rehmann

Chemical Engineering and Analytical Science, University of Manchester

Current Role & Research Activities: I'm a post-doctoral fellow working on biotransformations and enzymatic polymer degradation in ionic liquids. I work for Dr. Gill Stephens and was asked to attend the workshop on her behalf.

Jason Robinson

IBTI Club Steering Group Member

TMO Renewables Ltd.

Current Role & Research Activities: Associate Director of Engineering.

Ipsita Roy

Molecular and Applied Bioscience, University of Westminster

Current Role & Research Activities: I am a Senior Lecturer with research emphasis on biodegradable polymer production using microbial fermentation. The polymers I currently concentrate on are polyhydroxyalkanoates and my group is one of the only groups in the UK capable of large scale production of these polymers.

Declan Schroeder

Marine Biological Association of the UK

Current Role & Research Activities: Dr Declan Schroeder (Principal MBA Research Fellow) is a Molecular Biologist at the MBA where he has worked since 2001. His research interests revolve around three main areas: Pathology, Genomics and Biotechnology. Pathology: His research focuses primarily on determining the impact of viruses on biogeochemical and ecological processes. He is an associate member of the Working Group to *Investigate the Role of Viruses in Marine Ecosystems* - Scientific Committee on Oceanic Research (SCOR). Genomics: Another key area of his research involves genome annotation and developing genomic technologies such as DNA microarrays for model marine organisms to study key biological processes. In addition, he has developed a suite of novel molecular tools to investigate how plankton diversity has changed over space and time in our oceans. Biotechnology: In addition to addressing fundamental research questions, these virus dynamics are currently being investigated as possible novel gene delivery systems.

Andrew Shearer

Business Development and Marketing, Neem Biotech Limited

Current Role & Research Activities: We are an SME based in Cardiff specialising in the development of methods of extracting, separating and purifying active compounds from biomass, plant and marine and scaling up to kg scale. We are interested in collaborating with others in the development of new added value products from existing agricultural crops and also from novel crops, including the production of oils and proteins. We work with small molecules up to 1000 molecular weight. We are interested in looking at how we can produce as many high value products as possible from biomass down the chain and reduce transport costs by processing on the farm or as close to the point of production as possible. We are interested to talk with others in biorefining to see where our specialist expertise can be utilised to best effect in any research proposal.

Gary Sheldrake

School of Chemistry & Chem. Eng., Queen's University Belfast

Current Role & Research Activities: Senior lecturer in chemistry with research interests in green chemistry, especially renewable raw materials for fine chemical production and greener oxidation methods. Currently a partner in a 5-centre EPSRC project on Intensified and Integrated Biorefineries (IIBR) as well as new projects about to start on the conversion of lignin/lignosulfonates into fine chemicals.

Easan Sivaniah

Physics, Cambridge University

Current Role & Research Activities: EPSRC Advanced Research Fellow. Development of sustainable technology platform for polymer production using biorefinery approaches. Polyhydroxyalkanoate synthesis and characterization using in-vitro techniques.

Wolfgang Skibar

IBTI Club Industrial Coordinator

Bioscience for Business KTN

Steve Skill

Plymouth Marine Laboratory

Current Role & Research Activities: Microalgal Biorefinery R&D.

Lydia Smith

National Institute of Agricultural Botany

Current Role & Research Activities: Novel and Non-Food Crops; Programme Development Leader.

Robert Speight,

Ingenza Ltd

Current Role & Research Activities: Generation of green technologies and processes that use engineered microorganisms and biocatalysts for the manufacture of products such as fine chemicals, chemical feedstocks, nutraceuticals and fuels. Ingenza uses high-tech molecular biology techniques (such as strain engineering and directed evolution) and high yielding defined media fed batch fermentation to produce chemical products, microorganisms and biocatalysts. Ingenza's chemical development team then uses the biological products in the generation of economic and scaleable bioprocesses.

Brett Suddell

Sustainable Crop Management, ADAS

Current Role & Research Activities: Senior Materials Scientist. Responsible for research &

development of biocomposite materials and natural products for industrial applications. As the UK's leading research and consultancy organisation for rural and land based industries, ADAS is particularly well placed to assist Government departments, agencies, NGOs, commercial companies, universities, research organisations and farmers in the development of a sustainable renewable bio-products industry. ADAS currently employs 550 permanent staff and we have access to a reserve pool of a further 200 staff who can offer specialised advice on an ad hoc basis. ADAS expertise in renewable bio-products includes consultancy, research and project development; and covers: natural composites, biomass and biofuel crop production, specialist non food, high value cosmetic, pharmaceutical and nutraceutical products, and conversion technologies.

Chris Tapsell

IBTI Club Steering Group Member

KWS UK

Katie Tearall

Business Interaction Support Manager, BBSRC

Deri Tomos

Biological Sciences, Bangor University

Current Role & Research Activities: Professor of Physiological Biochemistry (Plants). Research interest in how different cells within complex tissues process metabolites and structural molecules. (Concept of a plant as a micro chemical plant producing valuable products.) Both Biochemical and Biophysical properties.

Belinda Townsend

Broom's Barn Research Centre, Rothamsted Research

Current Role & Research Activities: I am a researcher working in the field of plant biotechnology. My research focus involves investigating the potential to add value to sugar beet by manipulating the composition of the plant to improve the exploitation of by-products, and maximise the efficiency of sugar extraction and biofuel production.

Kris Wadrop

Green Biologics

Keith Waldron

Sustainability of the Food Chain, Institute of Food Research

Current Role & Research Activities: Leader of Sustainability of the Food Chain Exploitation

Platform with research interests in the areas of food waste, composting, biofuels and plant cell wall disassembly.

Ashley J. Wilson

Department of Chemistry, Green Chemistry
Centre of Excellence, University of York
Current Role & Research Activities: Commercial
exploitation of biorefineries through

consideration of the whole supply chain.
Specific interest in technologies for, and the
process of, conversion of biomass to high-value
biofuels.

Mike Wright

Oxford Innovation

CONTACTS

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Wolfgang Skibar (Industrial Coordinator)

Bioscience for Business KTN

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