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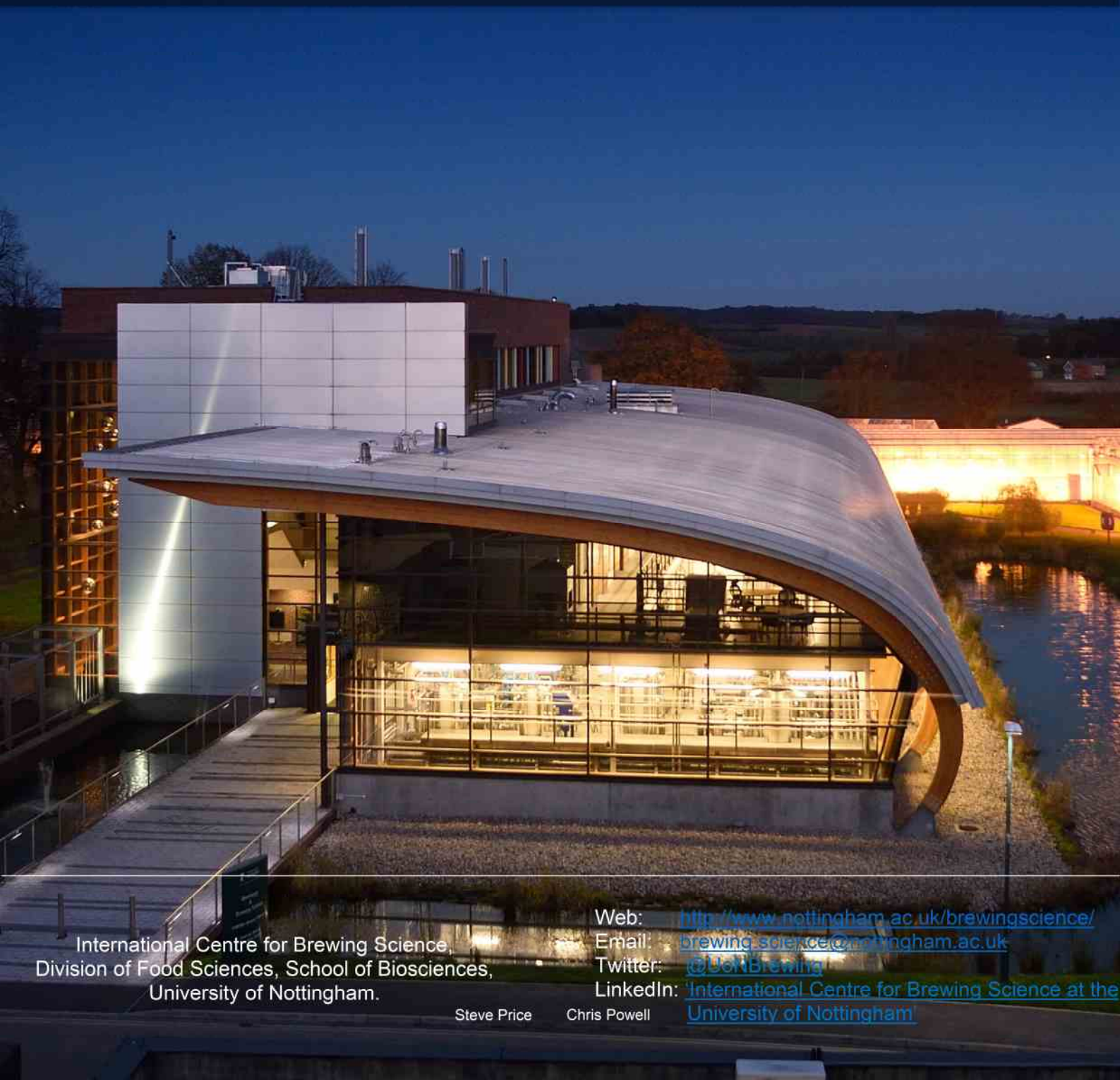
ICBS International Centre for Brewing Science

BREWING MATTERS ISSUE 8 December 2015



International Centre for Brewing Science,
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Steve Price Chris Powell

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Outer circle clockwise from top right: Anne Roberts, PA to SABMiller Chair; Sue Clegg, Micromalting technician; Linda Vickerstaff, PA to SABMiller Chair; Wendy Box, Technician; David Greening, Technician; Dr. Qinqi Wang (Steve), E-learning Developer; Melanie Stuart, Technician; : Dr. Chris Powell, Yeast & Fermentation Lecturer; Liz Dinneen, E-learning Student Experience Coordinator; Dr. Louise Hewson, Lecturer in Sensory Science;

Inner circle from top: Professor David Quain, Associate Professor; Steve Price, Industrial Fellow; Dr. David Cook, Associate Professor Brewing Science; Professor Joanne Hort, SABMiller Chair of Sensory Science and Head of Brewing Science; SABMiller Chair.

The team at ICBS would like to wish you all a Merry Christmas and a very prosperous New Year.

Do you want to develop your Brewing Science knowledge and enhance your career prospects?

Yes, then register for a course at the International Centre for Brewing Science at the University of Nottingham:

- **MSc Brewing Science and Practice (one year full-time)**
  or
- **MSc Brewing Science (three years part-time)**
  or
- **Short courses for Brewers**

For more information please visit our website:
www.nottingham.ac.uk/brewingscience

New MSc Fee structure for 16/17

- Home/EU students £6,630
- International students £20,330

Welcome to our new MSc Brewing Science & Practice students with a visit to Castle Rock Brewery.....

In September our new Cohort of students studying the MSc Brewing Science & Practice visited the Castle Rock brewery in Nottingham, as part of their welcome-week introduction to brewing course. Having spent the week thus far learning all about how beer is made and the diversity of beer styles which can be brewed, the time was ripe to go and see some of this put into practice.
Following on from an afternoon visit to the 10 hL SABMiller research brewery at Sutton Bonington campus, this was the group's second brewery trip of the day – a chance to see how a successful craft/regional brewer operates…..and to sample some of their products.
We were welcomed and shown around by head brewer Adrian Redgrove, who as usual was happy to answer any questions and explain his preference for barley varieties, how to manage hop supplies and his preference for a little bit of torrefied wheat in the grist of most brews (head retention!).

Touring the brewhouse enabled the group to see a largely manually operated mash tun – to compare with the 'stirred and transferred' MCV approach they had seen earlier that afternoon. Since whole cone hops are used, there was also an opportunity to discuss operation of the hop back.
But it's when we arrive at fermentation that Adrian really starts to talk in detail about his mixed strain yeast culture – occasionally complex to manage, but no other substitutions have approached it in terms of desired flavour and quality! A quick talk through the fining and racking operations and our tour ends convivially in the bar. Well, it's rude not to!
Harvest Pale anyone? Did I hear a Screech Owl……..?

Castle rock brewery

Research.....

David dispenses quality beer.....

Professor David Quain …..

"One of the joys of working in the brewing industry is the product. Whilst a beer or two at home from a can or a bottle – preferably in a glass – hits the spot, going to the pub for a pint with some chums is a whole different experience. But expectations are high (as are prices!) and my beer must be in the right branded (clean) glass and of excellent quality. Regrettably I am occasionally disappointed.
Being a quasi-microbiologist I have become increasingly interested and concerned - about the lack of concern - for draught beer hygiene. Although not all agree, beer is a food and, as such, should be managed by appropriate hygienic practices to assure beer flavour, aroma and clarity. Regrettably best practice is frequently not used.
So having joined Nottingham I'm going to do my bit to address some these concerns through projects and publications. As a starter for 10 ….

…..A New MRes

James Mallet

I'm delighted that we have recruited James Mallett for a one year MRes entitled 'An objective audit of draught beer quality in the on-trade'. This is funded through the Brewers' Research and Education Fund of the Worshipful Company of Brewers. James is a UoN microbiology graduate who currently works for Vickers/Lallemand in Burton and joined us at the end of November".

Conferences.....

Ola -the audience's choice.....

Oladokun Olayide

At the 3rd Nursten Flavour Symposium, Northumbria University,6-7 July, Ola Olayide, PhD student, delivered a talk entitled: 'The impacts of hop acids and polyphenols on the perceived bitterness of beer' and was the audience choice for the IFST award for best presentation. He was presented with an award certificate, given a yearlong free membership to the IFST and a £100 cash prize.

Then in October at the Early Career Researchers in Food Conference which took place at the Edgbaston Cricket Ground, Birmingham, 28th October, he gave a further presentation entitled 'Understanding the perception of bitterness in beer using a multidisciplinary approach'. This won him a further award for his oral presentation. He was given an award certificate from Mondelez and invited for a day tour of the Mondelez Research facility in Reading by the company.

Well done Ola!

The 10th International Conference on Beer and Beverage Technology, November 1-4, 2015 Jinan, China

Steve injects steam into China.....

Steve Price

Steve Price was invited to speak at the Chinese Brewing Conference in early November; this was the first time that ICBS have been represented at this conference. The conference has alternated between Beijng and Jinan in Shandong Provence and this year was held over 3 days at the China – Germany Brewing Technical Centre at Quiu University in Jinan.
Steve gave two presentations, which were very well received, his first talk involved steam technology and generated a lot on interest and many questions from the audience. His first talk:

The impacts of steam injection technology on volatile formation and stripping doing copper boiling.

The paper presents some of the data generated by Calum Holmes during his Ph.D. Studies. It looks at the general principles and objectives of copper boiling before describing the instillation of a live steam injection unit at a brewery in Africa. The operating procedures are described along with analytical data and sensory results from the beers produced . This information is then presented alongside the steam savings generated by use of a PDX unit.

His second talk was based around his considerable industrial experience both within, and outside, the brewing industry and provoked a number of questions from people in the audience who led teams.

His second talk:
How to make Technical People more impactful in organisations.

This talk identifies some of the attributes that Technical people can add to the overall performance of Brewing Companies and it describes some issues that exist in maximising their contribution. These can be addressed by actions in three specific areas – Corporate, Structural and Training . The Corporate actions centre around the organisation being very clear about its targets and how they are to be achieved.
Structural matters relate to the way in which organisations can choose to operate, which can mitigate the issues Technical people face while enhancing

The last area where organisations can support Technical people is with specific training, particularly about how to work in teams and support non-Technical team leaders

Steve presenting his talk

If you missed us at Brau or the Graduate fair at the NEC …

Then catch up with ICBS at next year at:

IBD Asia Pacific Convention 14-18th March 2016,
Sydney, Australia

Professor Joanne Hort (left) and Dr. Chris Powell (right) will both be presenting… watch out for the next newsletter for more details!

Dates for the diary.....

If you can't make Australia then visit us at the our stand **no. 29** at the 12th International Trends in Brewing 3-7 April 2016 in Ghent, Belgium, to talk to our ICBS team members to find out about our brewing science courses, our research or just to chat

Recent and forthcoming publications..

Article in the new book, 'Brewing Microbiology'

'Assuring the microbiological quality of draught beer' by D.E Quain in Brewing Microbiology - Managing Microbes, Ensuring Quality and Valorising Waste (ed A. Hill, Woodhead Publishing), (2015), 333-352.

Abstract:
The draught beer category is in long-term decline. Product quality is one of a number of factors that have contributed to consumers switching from the on- to off-trade. This reflects increasing dispense system complexity and poor hygienic practices that together result in poor product microbiology.

Routes to improve system hygiene and product quality require sustainable implementation of recognised best practice. Whilst doing the right things right would provide a ready improvement on product quality, there are also a number of diverse innovations that individually and collectively could make a positive difference to the assurance of draught beer microbiology and consequent quality.

Papers:

Chaya C , Eaton C, Hewson L, Fernandez Vasquez R, Fernandez-Ruiz V, Smart K and Hort J (2015) Developing a reduced consumer-led lexicon to measure emotional response to beer.
Food Quality and Preference. 45, 100-112.

Abstract:

Previous researchers have recently recommended and utilised consumer-led lexicons to measure emotional response. This study further advances this approach by 1) making the lexicon generation process more efficient by using consumer focus groups as opposed to individual consumer interviews and 2) decreasing the number of responses required from each

consumer by reducing the lexicon to categories of similar terms. In response to 10 lager samples which were manipulated in order to control selected sensory properties, focus groups generated a lexicon of 44 emotion terms. This lexicon was reduced to 12 distinct emotion categories using linguistic checks and cluster analysis. Naïve beer consumers (n = 113) used these 12 emotion categories to rate their emotional response to the 10 samples. The reduced consumer-led lexicon was validated through its ability to discriminate across samples as well as show differences in emotional response between genders and age groups. The 12 emotion categories were found to discriminate well between samples, although a number of categories grouped samples similarly. However, differences in responses to otherwise comparable emotion categories were identified between genders and age groups, highlighting the importance of including all emotion categories so as to not over-reduce the lexicon and risk missing out on valuable emotion data.

Linforth R.S.T., Westwood K., Somani A., Doherty N., Cook D.J. (2015). Hop proanthocyanidins for the fining of beer. J Inst. Brew., 121(4):490-5.

Abstract:

Fining agents are used in the clarification of beers; they help to reduce the time required to sediment suspended yeast cells and ensure the clarity and colloidal stability of beer. Following an adventitious observation during dry-hopping experiments, we identified a fining activity associated with Saaz hops. Extracts of hop cones were subsequently shown to have the capacity to flocculate yeast and result in their sedimentation. This activity has since been identified in extracts of many different hop varieties and, significantly in spent hops, the co-product resulting from commercial extraction of hops with either CO2 or ethanol Here we illustrate the activity of the novel finings extracted from spent hops following CO2 extraction of Galena hops. The sediments formed on fining were compact, relative to those obtained when commercial isinglass was used to fine the same beers. The hop extracts were also effective in reducing 90° haze in beers under conditions designed to mimic both cask ale (12°C) and lager (4°C) type applications.

The compounds responsible for the fining activity appear to be large (30 to 100kDa, or more) polyphenols. Analysis of the polyphenols using colourimetric tests, indicated the presence of proanthocyanidins. On acidic hydrolysis these generated cyanidin, which would be derived from a polymer composed of catechin and epicatechin subunits. The presence of these materials in spent hops offers the possibility to develop commercial products, with desirable fining properties, from an existing co-product stream. Furthermore, the finings are derived from a traditional ingredient of the brewing process.

Kostas E.T., Du C., White D.A. & Cook D.J. (2015). Selection of yeast strains for bioethanol production from UK seaweeds. Journal of Applied Phycology. DOI: 10.1007/s10811-015-0633-2.

Abstract:

Macroalgae (seaweed) are a promising feedstock for the production of third generation bioethanol, since they have high carbohydrate contents, contain little or no lignin and are available in abundance. However, seaweeds typically contain a more diverse array of monomeric sugars than are commonly present in feedstocks derived from lignocellulosic material which are currently used for bioethanol production. Hence, identification of a suitable fermentative microorganism that can utilise the principal sugars released from the hydrolysis of macroalgae remains a major objective. The present study used a phenotypic microarray technique to screen 24 different yeast strains for their ability to metabolise individual monosaccharides commonly found in seaweeds, as well as hydrolysates following an acid pretreatment of five native UK seaweed species (Laminaria digitata, Fucus serratus, Chondrus crispus, Palmaria palmata and Ulva lactuca). Five strains (three Saccharomyces spp, one Pichia sp and one Candida sp) were selected and subsequently evaluated for bioethanol production during fermentation of the hydrolysates. Four out of the five selected strains converted these monomeric sugars into bioethanol, with the highest ethanol yield (13 g L-1) resulting from a fermentation using the hydrolysate from C. crispus hydrolysate with S. cerevisiae YPS128. This study demonstrated the novel application of a phenotypic microarray technique to screen for yeast capable of metabolising sugars present in seaweed hydrolysates; however, metabolic activity did not always imply fermentative production of ethano