

## Beer: old's now new again



*Peter Rogers*

School of Science Griffith University  
Brisbane, Qld, Australia  
Email: peterjohnrogers@me.com

**In the 'Executive Style' section of a recent edition<sup>1</sup> of *The Age* newspaper there was a list of the top 100 craft beers in 2016. That's a ranking out of 300 or more national craft beers. The craft boom is driving a renewal in technical training, career opportunities and a deeper understanding of the underlying scientific basis of traditional brewing approaches.**

Craft beers if you weren't aware are booming<sup>2</sup>. But the mainstream makers are losing market share, although they still make most of our beer. But spare a thought for them; they must worry about the continual threat of acquisition.

The two majors in Australia belong to Kirin and the global behemoth Anheuser-Busch-InBev. Remarkably the big five global companies make >50% of the global output. But a David and Goliath epic is unfolding; in the USA there are 4269 craft/boutique beer makers (a figure already out of date) capturing 12% of market share, with a growth rate of over 13% (2015). The Australia figures trend in the same burgeoning direction. The implications for employment and careers in all aspects of the trade are immense.

Mergers and acquisitions have resulted in the disappearance of many breweries especially in Europe and the UK. Corporate R&D centres have closed and technical numbers drastically reduced. At first there was a large drop in technical association memberships. But lately the tide has turned as craft brewers now sign up.

Takeovers, a staggering hallmark of global beer making can have some benefits. This is because intrinsic and extrinsic knowledge gets lost. And often when the dust settles it needs to be replaced. When iconic beer brands are transferred from small to large industrial breweries with the look and feel of oil refineries the unexpected can and often happens.

Yeast has its *prima donna* side: it may refuse to produce alcohol and sulk when moved from one brewing site to another. It is fussy about wort ingredients: too much N or little upsets the ester balance (think in terms of redox balance) and spoils the beer. The UK experience makes interesting reading: as a result of a crop of regional closures beer brands have moved to the sites of the new owners.

Matching beers is not easy. Thomas Hardy's Ale, was first brewed by UK's Eldridge Pope to commemorate a literary festival in Dorchester, Thomas Hardy's country. The company however closed overnight in 1996, becoming a pub-owning retailer, but without enough regard to the whereabouts of yeast cultures, and the brewing conditions for some of its iconic brands. Some clever detective work, found a suitable German yeast and a passable, albeit complicated brewing process to make the Festival beer once again. Whether it lives up to Hardy's original description in his Wessex novels: 'brisk as a volcano, full in body, piquant. . . luminous as an autumn sunset', is hard to say.

The authentic reconstruction of iconic German beers like Berliner Weiss, Kölsch, and Helles biers is likewise difficult but not impossible. One of the reasons no doubt they have been superseded by modern methods. It's worth asking though, whether these beers performed better overall – especially with respect to ageing – than those available now. Beer is notoriously sensitive to oxidation.

Size begets rationalisation – standardisation of process and engineering, yeasts, and ingredients. Large plants provide economies of scale. Hygiene, product specification and consistency, stability, and standard operating procedures are front of mind. Esters, free radical buffering, shelf-life predictions, yeast vitality and viability define the operations. Thus hop bittering extracts have replaced the use of dried/compressed hop cones in many plants because of better utilisation; so yeast esters act as ersatz hop aroma and taste. Likewise it is far cheaper to use high-gravity brewing to increase plant capacity compared to capital outlay. Both are smart technologies but there is always a catch and it has always been the technical staff who have found solutions albeit not necessarily perfect. Genetic analyses have not made much of an impression on beer making. They have elucidated aspects of brewing yeast behavior<sup>3,4</sup> but the commercial potential of GM has been ignored. Sadly that includes the potential to boost beer stability. There is absolute reluctance to break with tradition. 'GM' is missing in the trade's global vernacular.



Figure 1. Brewers and owners, Jayne Lewis and Danielle Allen, cofounders of Two Birds Brewing<sup>8</sup> in Spotswood Victoria. Hearsay has it that females make up about one-third of all craft brewers' customers.

Barbra Tuchman<sup>5</sup> describes 'folly as the pursuit by governments of policies contrary to their own interests'; she could be talking about the Pabst brewery (nee1880). Pabst was a great Milwaukee brewery which over time concentrated on efficiency and profit and lost sight of their ardent customer base. A slow loss of beer quality was missed by the tasting panels. The customers and Pabst both faded away. To make matters worse, there was a huge societal change happening at the same time, which was transforming the commuter class into the aspirational café set. Does this sound familiar?

Is history repeating itself? *The Age* article suggests it is. Before the craft boom hop farms were removing high performance bittering vines because of falling beer sales. Demand by craft makers changed all that. Hop fields are being replanted with aroma hops. New Zealanders were quick to pick the move. Their breeding program<sup>6</sup> has produced celebrity aroma varieties – Nelson Sauvin, Rakou, Riwaka, Southern Cross, Wai-Iti, and Wakatu. Some brewers are even growing hops for in-house use.

Some recent work<sup>7</sup> suggests that green hopped and dry hopped beers are very resistant to oxidation. It's even been suggested that aroma hop compounds can protect, and fuel the peroxidase activity

of proteins like thioredoxin that make it into final beer. Local seasonally produced green hopped beers<sup>7</sup> showed no deterioration after a year, and no oxidation of 'key' protein thiols.

Small breweries, need a mix of skills, agronomics, biochemistry, microbiology, engineering and flavour chemistry. They need the 'Jacks and Jills<sup>8</sup>-of-all-Trades' (Figure 1), who can cover anything, and importantly spot opportunity, which is probably why many combine work and study<sup>2</sup>. Craft brewing provides technical and scientific careers for graduates, opportunities in hop breeding and horticulture, and barley breeding and malt production.

Importantly craft brewers make beers to savour not necessarily to quaff. That I believe is worth celebrating.

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## Biography

**Peter Rogers**, one-time academic, one-time Carlton and United Breweries R&D manager, is currently adjunct professor at Griffith University and instructor with Chicago's Siebel Institute. ARC funding, collaborative research, and postgrad in-house placements achieved a lot at CUB. Would an ANU PhD in developmental biology have predicted a zig-zag career path? Not really! That's why he promotes an 'eyes wide open' approach to education and career.

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