

# Queens College chancellor ale

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## Introduction

I was intrigued to read John A.R. Compton-Davey's article on the history of audit ales.<sup>1</sup> He dealt mainly with those brewed for Cambridge colleges, but did include Chancellor Ale, a strong brew produced in October each year at Queen's College, Oxford. That beer has fascinated me for some years, and I have made several attempts at brewing it.

Reproducing historical artifacts and lifestyles has become relatively popular in recent times, even forming the basis of a good few television programmes. In the case of beer, Dr John Harrison and The Durden Park Beer Circle<sup>2</sup> have done some sterling work in researching and reproducing beers of the 18<sup>th</sup> and 19<sup>th</sup> centuries. Various micros have produced beers from old recipes - Heather Ale (Williams Brothers Brewing Co.), Jacobite Ale (Traquair House Brewery), and 1850 London Porter (Pitfield Brewery) all spring to mind. I have experimented with several old porter recipes on a small-scale in my own 5-gallon brewery. Two of these, one from the 18<sup>th</sup> century<sup>3</sup> which we called Presumptuous Porter, and the other from one of Amsinck's 19<sup>th</sup> century recipes,<sup>4</sup> were

later brewed on a 7-barrel scale by myself and Jeff Browning, the brewer at Brū Rm@BAR, a brewpub in New Haven Connecticut.

The problem with most of these attempted reproductions is that the raw materials, especially brown and amber malts, as well as hops and yeast are no longer available. Modern equivalents may exist, as in the case of brown malt, for example, but the latter is produced in a manner different to that used in the 18<sup>th</sup> century. The brown malt of those days could be mashed directly, but today's version cannot. It contains sufficient unconverted starch, that attempts to mash it on its own simply results in a huge lump of gelled grain, the worst 'set mash' I have ever seen. In addition to this, recipes are often incomplete. We do not know what kind of yield those brewers achieved from their malts, for original and finished gravity are often not known (or not even measured in the case of pre-1784 beers). In most cases we can only guess at mash temperatures, for even well into the 19<sup>th</sup> century it was common practice to measure the temperature of the wort at run-off, rather than that of the mash itself! And, of course there is no analysis of the finished beer available, so

we can only guess at how it tasted. Brewing techniques, too, have changed. Mash temperatures are now tightly controlled, sparging has taken the place of double mashing, whirlpools may be used to separate trub, and coolships have been replaced by heat exchangers. Perhaps more importantly, in terms of flavour, fermentation in wooden casks and ageing in huge wooden vats has been virtually eliminated.

### **Brewing chancellor ale**

But in the case of Chancellor Ale there is a very big difference from all these other

old recipes. For it was produced in the College's own brewery right up until 1937, and a few years before this it was visited by the brewing author H. Lloyd Hind. He described it in some detail,<sup>5</sup> suggesting that brewing had been carried out at the college since its foundation in 1340, although he is not clear as to when the brewhouse in existence in the 1920's had been erected. But he is clear about the construction of the brewery and the brewing process. In fact the brewery still remained in 1937 very much as it would have been in the 15<sup>th</sup> and 16<sup>th</sup> centuries, being constructed much as other preserved old breweries, such as Lacock Abbey,<sup>6</sup> and Shibden Hall, Halifax<sup>7</sup> (Fig. 1)



*Figure 1. Shibden Hall, Halifax: the copper and part of the wooden coolship.*

The standard procedure for brewing 9 barrels of College Ale involved mashing being conducted in a wooden tun with no false bottom, only two 'spend pipes' covered by metal strainers, and the copper was (presumably) wood fired. A hand pump dating from 1778 conveyed the wort from the mash tun to the copper via lead(!) pipes; pumps were not otherwise used. Two separate mashes were carried out, and the two worts were boiled separately with the hops, then run to two long shallow vessels (coolships, see Figs 1 and 2) for cooling. Yeast was pitched to the fermenter, but the liquid was ladled

into wooden casks after 'one day and a night'. The green beer sat in the casks for 6 days, with the frothing yeast/beer mixture being collected and re-cycled to the cask. At this stage the beer is finally racked into upright wooden, 3-barrel capacity casks, and stored for a year before drinking. This procedure was varied for Chancellor Ale, which was produced by the time-honoured 'parti-gyle' system. In this case the stronger beer was brewed by collecting 2½ barrels of the first wort, and separately boiling this gyle with the hops, cooled and fermented as for College Ale.



*Figure 2. A view of a copper coolship at Elgood's Brewery.*

## Raw materials and analysis of chancellor ale

just a description of the brew house and its workings, for he also gave the recipes in full, and gave analyses of the finished beer:

But Lloyd Hind gave us much more than

Pale malt: 28 bushels (7 Quarters\*)  
Hops 26 lb\*\*  
Yeast\*\*\*  
Final brew length of Chancellor Ale 2½ barrels\*\*\*\*

\*1 Quarter is 336 lb, but since a bushel is strictly a volume measure, this is only an approximation.

\*\* Lloyd Hind did not refer to the actual hop variety; since they came from Burton, it is a reasonable assumption that they would have been Goldings, or possibly Fuggles. Hind did however state that the wort for chancellor ale was boiled with all 26 lb of hops.

\*\*\* As the yeast came from Burton it may well have been a powdery, non-flocculent strain, which would be ideal for obtaining good attenuation with such a high original gravity beer.

\*\*\*\* Lloyd Hind quotes this figure in the *Brewer's Journal* article; in his book he states that 2½ barrels of wort is taken for this beer, and a loss of 10-15% would be expected to occur by evaporation during boiling.

*Table 1. Ingredients (All sourced from Burton)*

Original Gravity	1135.3*
Pounds Gravity	48.7**
Present Gravity	1052.8***
Alcohol, % w/w	8.46
Alcohol, %v/v (ABV)	10.7****
Lactic Acid, %	0.77*****
Colour, 1 in. cell	104.0*****

\* This is Lloyd Hind's actual measurement on a single brew; elsewhere he lists it as a '50lb' beer, or 1139 OG.

\*\* Brewer's pounds as a measurement of wort gravity was introduced by Richardson in 1784; this unit was used by virtually all English brewers until after the Second World War, when it was replaced by the simpler (dimensionless) measurement of specific gravity.

\*\*\* This is the gravity after fermentation, presumably that of the beer going into the final storage butt. The number indicates an apparent attenuation of about 61%, somewhat lower than we would expect for standard beers today, but quite reasonable for a beer of this strength.

\*\*\*\* ABV is simply a calculation from Hind's w/w measurement

\*\*\*\*\* This is a high figure by modern standards (see below), but might be expected for a beer vatted in wood for a long period.

\*\*\*\*\* This method (presumably using the Lovibond Tintometer with a one-inch cell, as described by Hind) has been superseded by an EBC method; it is difficult to compare the two, but probably means the beer was a fairly dark colour, though not black.

*Table 2. Analysis of Chancellor Ale*

## Deconstructing the beer

Clearly, this is a fairly complete account of the beer as it was in the early part of the 20<sup>th</sup> century, and makes it relatively easy to reproduce. Which still leaves room for doubt as to how close was the beer sampled by Lloyd Hind to that produced at Queen's in the 18<sup>th</sup> and 19<sup>th</sup> century. The first question to ask is how far back does the use of pale malt go? Were, for example, the popular brown and amber malts used in the 18<sup>th</sup> century? I think we may be able to discount brown malt, for two reasons. First, brown malt was largely used for brewing porter, and this was not a beer produced in small towns such as Oxford, nor by ale-brewers - Henry Brakspear, for example, only experimented with porter brewing in the 1780s and 1790s.<sup>9</sup> Whether or not amber malt was used is more problematic, and we can only make the assumption that in such a simple process just one malt would have been used. If so, that would have been pale malt, although it would surely have been somewhat darker than modern pale malts.

As far as hop varieties are concerned, my assumption above that they would have been Goldings or Fuggles might be disputed by some. After all, Bass used considerable quantities of American hops in the late 19<sup>th</sup> and early 20<sup>th</sup> century, and some of these might have made their way to Queen's College in Oxford. I would argue two points against this. First, although we do not know when the Queen's College Brewery began to obtain

raw materials from Burton, it seems reasonable that this would not have happened until Burton became a major brewing centre. This would mean it was some while after 1830, so that the practice would have continued for less than a hundred years, a relatively small part of the brewery's lifetime. Second, I think that the variety of hops used in this beer is irrelevant. They are added only at the beginning of the boil, so will yield only bitterness; any flavour contributions from the hops would be small, and surely masked by those from the malt, yeast by-products and high alcohol content.

This raises the question as to what was the bittering level in Chancellor Ale. We know how much hops were used, namely 20 lb in a 2½ barrel brew length. It should be noted that the 26 lb quoted above were for when the whole brew length went to make College Ale. But how effective were these hops as bittering agents? It is not unreasonable to assume that older varieties of hops would have had about the same bittering effect as today's aroma hops.<sup>10</sup> If so, and we assume a level of 4% alpha-acid (footnote), then we can make a calculation, based on the definition of International Bittering Units (I.B.U.). For this we need to know the hop utilization rate, that is how much of the alpha-acids were converted into iso-alpha-acids, which are the actual bittering agents derived from hops. That depends upon a number of factors, notably boil efficiency, wort specific gravity, and fermentation losses. In a simple brewery operation such as at Queen's, with the

high wort specific gravity of Chancellor Ale, a utilization of 20% alpha-acid might be the maximum we could expect. Assuming this figure the I.B.U. for Chancellor Ale calculates out at around 180 I.B.U.! That is a phenomenal number for two reasons. One is that our ordinary 4-5% premium ale with a level of 30-50 I.B.U. would have a very distinct bitter flavour. The other is that the solubility of iso-alpha acids is thought to be limited to a maximum of around 100 I.B.U., and probably less for a high alcohol beer such as Chancellor Ale, although no one to my knowledge has ever carried out such a measurement with this beer. In fact the excess amount of alpha-acid over the notional maximum of 100 I.B.U. would probably have been used in the second boil, the College Ale from this brewing. I therefore took the approach in my 'reproduction' of adding sufficient hops to give a *calculated* value of about 100 I.B.U.

Before proceeding with my own brewing efforts, I must say something about the level of lactic acid found by Lloyd Hind. A relatively modern reference<sup>11</sup> suggests that British beers contain 0.04-0.3% lactic acid, below the taste threshold of 0.4%. An older source<sup>12</sup> cites several samples of Burton ales at around 0.2%, and even quotes a 90 years old sample of Worthington Burton Ale at only 0.6% lactic acid, a high value but still below that for Chancellor Ale. Indeed the same source gives a figure of only 0.25% for a sample of Guinness Foreign Extra Stout, a beer designed to have a relatively high acidity. Guinness Foreign Extra Stout was vatted

for up to 2 years before shipping for sale in the late 19<sup>th</sup> century, and in 1898 an acidity level of 0.27% was considered to be the maximum for a saleable beer.<sup>13</sup> For comparison, Wahl-Henius also found that Belgian Lambic beer, whose main characteristic is its sourness, contained 1.1% lactic acid. Clearly the Chancellor Ale sampled by Lloyd Hind was very sour by modern standards, the acidity presumably coming from the micro flora resident in the wood of the casks used for fermenting and storage of the beer. However, Lloyd Hind stated that the chancellor ale he sampled was three years old and 'in bottle', and he went on to say 'Its flavour, though acid, was wonderfully vinous and pleasant, the acidity being hidden by the buffering colloids of the beer'. He did not give the age of the College Ale sampled, which apparently came from the casks currently on tap. This latter beer threw a deposit of secondary yeast, 'with scarcely any bacteria'.

Interestingly, Lloyd Hind made no mention of the presence of any odd flavours, such as 'horse blanket or leathery', which derive from *Brettanomyces* wild yeast species, known to have occurred in English Stock Ales.<sup>14</sup> If *Brettanomyces* strains were absent, then the acidity probably came from some unidentified lactobacilli strain. At any rate, since we have no knowledge of what bacteria and/or wild yeasts might have been present in the casks, it is not possible to reproduce this part of the brewing process for chancellor ale. I say that with some relief, as I did not want to drink such an acid beer!

## Reconstructing the beer

It is clear from the above that it is possible to make a version of Chancellor Ale which is fairly close to the original, but which will not match it exactly. Nevertheless, I decided to proceed with brewing the beer, and set about devising an appropriate recipe. This promptly showed me that there was going to be a fundamental difference in my brewing process to that used at Queen's College. In short, I could not brew this beer by taking the first wort runnings and using the later runnings to brew a smaller beer. That was because there was a physical limit to how much malt the mash tun could contain, which in turn limited the volume of first runnings that would be obtained. In fact, I could not expect to have enough high gravity wort to operate the boiler satisfactorily.

I was left with two options, the first being to do two mashes, collect first runnings from each and combine them. The logistics of doing this and handling two lots of second runnings were just beyond my capabilities at that point (although I plan to attempt this at some time in 2009). Therefore, I took the second option, and collected all the runnings, along with sparging the grain. My mash tun was still almost full, but now I could finish with a volume sufficient to run the copper boil properly. That meant a long boil (about 3 hours) in order to concentrate the wort so as to arrive at the high original gravity of 1.140. It also meant that there would probably be a fairly high degree of caramelisation of the wort, perhaps more

than would have occurred in brewing the original at Queen's College.

The rest of the brewing was much as I have outlined, using only Maris Otter pale malt. I again made an exception in the bittering hops, going for a high alpha-acid (11.6%) variety (Target). My reasoning was that in the original the hops were only added at the start of the wort boil-ing, and contributed only bitterness, as mentioned earlier. For the same level of bitterness, a smaller quantity of hops would be required, and therefore less trub would be formed if I used Target, than if I opted for lower alpha varieties such as Fuggles or Goldings. A smaller amount of trub would mean less loss of wort, an important consideration in brewing such small amounts.

I opted for a Whitbread yeast strain (exact source unknown) for fermentation, because it was the house yeast at Brū Rm@BAR, and had demonstrated an ability to handle relatively high gravity worts. I could have used a Burton strain (brewery source also unknown) which is available here in the U.S. But I decided not to, since I know this strain to produce quite high ester levels in ordinary low gravity beers, and feared that ester production might have got out of hand in a beer like Chancellor Ale. I also opted to oxygenate the wort after pitching the yeast, as is common in modern practice. This, of course, is a departure from the Queen's College procedure, but this was an expensive brew and I was not prepared to countenance failure! At any rate, fermentation proceeded in a normal man-

ner, although the final gravity of the beer was somewhat higher than that quoted by Lloyd Hind. Specifics are given in Table 3.

Maris Otter 2-row pale malt  
Target hops (11.6%) to give 100 IBU\*  
Whitbread yeast  
Original gravity: 1.140  
resent gravity: 1.064  
ABV (%): 10.0

\*This is a calculated, not analytical value

*Table 3. Raw Materials and brewing results*

### **The acid test**

This, of course, refers not to lactic acid, but to how the beer tasted. This took place at Scoozi's Restaurant, in New Haven, Connecticut, which every year stages a Game Dinner, with Brū Rm@BAR providing the beers to match the courses. It was not judged by a formal tasting panel, but by the guests who sampled it along with dessert. At this point the unfiltered and unfiltered beer had aged on the yeast for one year in a stainless steel keg with no artificial carbonation. It poured with just a little head, and a deep black-brown colour, though still slightly translucent in the glass. Since I do not like the use of grandiose and fanciful terms to describe beers, I can only say that it was luscious, full-bodied with some caramel present, and well-balanced; neither the high hop bitterness, nor the high alcohol content stood out. In short, it was voted an excellent beer by the assembled company.

### **Conclusion**

I have endeavoured to show, thanks in good part to Lloyd Hind's analysis, that it is possible to understand just how, and from what a beer with medieval roots would have been brewed. Compared to most other 'old' beers we have a great deal of information on Chancellor Ale, yet I have shown that there are still some gaps in our knowledge of this beer. I have also indicated that even when assumptions are made so as to fill in those gaps, brewing a modern version of the beer requires some deviations from the original procedure. After the initial effort to reproduce this beer, I have made further attempts to correct the deviations, but have not yet succeeded in doing so. That is partly because it is not expedient to brew such a beer other than once or twice a year, which makes for slow progress in experimentation.

I must conclude with some comments upon the strength of Chancellor Ale. There seems to be a dismissive attitude in Britain today at beers at 8% ABV and above, as though they are not considered suitable for drinking compared to our ordinary everyday beers. American brewers and drinkers are more open to such 'big' beers and commercial brewers have even offered beers as high as 15, and even 25% ABV. Nevertheless, when I introduced a later version of Chancellor Ale at 12.8% ABV, during another Game Dinner at Scoozi's there was an audible intake of breath from the guests. My response to this was to point out that we



were serving the beer in wine glasses, and that many commercial wines today are closer to 14% ABV and no one finds fault with that!

I think the point here is that, yes, Chancellor Ale is not a beer to be drunk in quantity, but that it is still a part of the spectrum of beer. Drunk in small amounts and in a respectful manner it offers a worthwhile experience, a demonstration of beer's great variety, as well as being a part of our heritage.

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