

## Ingredients

Beer has four basic ingredients: malt, water, hops and yeast. The malt provides the sugars which the yeast ferments into alcohol. The hops add beer's distinctive bitter note.

For much of the period covered by this book, those four ingredients, and sometimes sugar, were the only ingredients allowed by law. It was only in 1880 that the law was liberalised and adjuncts such as corn and rice were allowed as alternative sources of fermentable material.

## Malt

Malt is produced by fooling barley into germinating and then stopping the process before the grain starts to sprout by drying it in a kiln. This starts the process of converting the starches in the grain into sugar that yeast can ferment.

Historically, far fewer types of malt were available than today. In the first half of the 19<sup>th</sup> century, only five types were used: pale malt, white malt, amber malt, brown malt and black malt. Crystal malt was developed quite early in the 19<sup>th</sup> century, but only came into common use in the 20<sup>th</sup> century.

Britain was unable to grow enough grain for either bread-making or brewing purposes from the middle of the 1800s onward. Large quantities of barley were imported, but it was always malted in Britain. It made sense, as British malting technology was the best in the world. Much came from North America, particularly California, but many other regions also supplied grain, such as the Middle East, Australia, Chile and continental Europe.

Brewers liked to use a mix of British 2-row barley malt and foreign 6-row barley malt and got all upset when the world wars interrupted the supply of Californian barley.

## Pale malt

Pale malt first evolved around 1600, when maltsters in the Midlands began to kiln using coke, a type of coal with impurities such as sulphur removed, as a fuel. The extra control possible with this fuel allowed a reliably pale malt to be produced. Starting as an expensive novelty, its use exploded in the late 18<sup>th</sup> century when brewers discovered, through the use of the hydrometer, how much better the yield – and hence more economical – it was than other base malts. By 1800 pretty much every type of beer used pale malt as its base.

The need for high-quality pale malt for Pale Ale brewing led to the evolution of a specific kind of malt, pale ale malt. It was made from top-quality barley and kilned as pale as possible. The best substitute for this is the best modern British pale malt. Though not Maris Otter. That's kilned too dark.

## Brown malt

Brown malt is a tricky devil to pin down. It has been made in many different ways and had many different characters over the years.

In the 18<sup>th</sup> century, it was diastatic, that is the grains contained sufficient enzymes to convert their starch into sugar, and regularly used as a base malt. The earliest Porters and Stouts were brewed from 100% brown malt. London brewers usually purchased their malt from Hertfordshire, just north of London. There it was the custom to use straw as a fuel the final stage of the kilning where the temperature was increased dramatically. In other areas different fuels were used and these had a big impact on the flavour of the malt.

By the 1800s, the method of producing brown malt had changed, probably due to the changing way it was used. Porter grists contained so much pale malt that brown malt no longer needed to be diastatic. But, the reduced amount used also meant that it needed to be darker to give Porter its expected colour. During the final stages of its production, it was roasted at a very high temperature by adding faggots of hornbeam, a hardwood that burns with an intense heat but very little smoke.

It could be a dangerous process, as many malt kiln fires can confirm. For fire-safety reasons the hornbeam method was abandoned around 1950 and replaced with drum-roasting, similar to the way black malt is produced.

### **Amber malt**

If pinning down brown malt is tricky, amber malt is downright impossible. 19<sup>th</sup>-century sources tell us that it filled virtually the whole spectrum between pale and brown malt, depending on the maltster. Many brewers had it made to their own specification.

It also changed over time. Amber malt was one of the three 18<sup>th</sup>-century base malts but by the mid-1800s had almost certainly lost all its diastatic power due to changes in the way it was kilned.

### **Black malt**

This is a great example of a technological advance spurred on by legislation. An Act of Parliament in 1816 outlawed the use of any ingredients in beer other than water, malt, hops and yeast. Amongst the items forbidden were some that had been used to colour Porter. Within a year Wheeler had developed a new type of malt, roasted in a drum roaster much like coffee beans. It was immediately adopted by Porter brewers, who, having reduced the brown malt content to 30 or 40%, were having trouble getting their beers dark enough to match consumer expectations.

The black malt used by Guinness in Ireland was quite different to the English sort. It wasn't as roasted and really fell somewhere between brown malt and black malt.

### **Roast barley**

As I've read this story so many times I'm going to make this very clear. Guinness did not use roasted barley in the 19<sup>th</sup> century to avoid paying tax. Before the Free Mash Tun Act of 1880 it was illegal to have any type of unmalted grain on brewery premises. There were heavy fines and possible confiscation of brewing equipment for offenders. Guinness didn't use roasted barley in the 19<sup>th</sup> century full stop. They only adopted it in the 1930s.

While I'm debunking myths, the stuff about the difference between Porter and Stout being the

use of roasted barley in the latter is also bollocks. After 1880, London brewers used either black malt or roast barley, but whichever they chose would go into both their Porter and Stout. As they regularly parti-gyled them, it would have been pretty difficult, no impossible, to use different malts in the two styles.

### Crystal malt

Although crystal malt was initially developed around the middle of the 19th century, it wasn't widely used until much later. Just as today, crystal malt came in a variety of colour shades. Unfortunately, this isn't recorded in brewing records which means when specifying a specific type in a recipe, I've had to guess.

### Mild malt

In the late 19th century maltsters began to develop different types of pale malt aimed at the production of specific types of beer. There was PA malt for Pale Ales, SA malt for Strong Ales and MA or mild ale malt for, unsurprisingly, Mild Ales. The very best barley was reserved for PA malt, and slightly lower-quality barley for MA malt. It was also kilned slightly darker.

Despite Mild Ale itself having fallen into obscurity, mild malt is still readily available. I've specified it in two ways in the recipes. The most obvious way is in beers where it's mentioned by name in the original brewing record. The second is for early 19<sup>th</sup>-century beers which didn't use the top-grade of pale malt. Mild malt is probably a better match for second-grade pale malt than modern pale malt.

### Lager malt

You might expect to only find lager malt in bottom fermenting beers, but that's not true. It pops up in the recipes of some Ales. Admittedly, often during WW II, when brewers made use of anything they could get their hands on.

### Oat malt

In the 1890s Maclay of Alloa introduced (and trademarked) Oatmalt Stout, bringing back into use a type of malt which had largely disappeared when Oat Ale finally faded away in the mid-1800's. Unsurprisingly, it mostly crops up in Stout recipes, though in WW II it was used in other styles. Not voluntarily, I might add. There was a bumper crop of oats one year and brewers were forced by the government to replace 10% of the barley malt in their beers with oats. It was mostly in the form of flakes, but sometimes it was malted.

### Hops

While beer has been brewed for thousands of years it's only relatively recently that hops have been used to flavour it. Britain was quite late to adopt hops, which were first introduced by Flemish immigrants in the late 14<sup>th</sup> century. Hops serve two purposes: to help preserve beer from infection and to flavour it.

In recreating old recipes, hops provide their own particular problems. Brewers, economical as they were, would buy more hops than they needed in years where the harvest was good and prices were cheap. They'd keep them to use in years when hops were expensive. That meant

that it was common to have hops that were two, three or even more years old. I've had to take into account the drop in alpha acid, the primary compound in hops responsible for bitterness, over time when formulating the recipes, as I assume you won't have stocks of old hops to hand.

When Britain's economic and population growth outran its agriculture around 1830, there was a transformation in the hops used in British beer. Massive quantities were imported from just about every corner of the globe. Many imports were used as workhorse bittering hops and only a few types were regarded as being good enough for aroma hops or dry-hopping. Hops from the USA, Belgium, and France fell into the first group, ones from Germany and Bohemia into the second.

## English hops

On the face of it, one type of English hop was used throughout the whole period covered by this book: Goldings. They were first developed in the 18<sup>th</sup> century and have been a favourite of British brewers ever since.

However, things are a little more complicated. In the middle of the 19<sup>th</sup> century the meaning of Goldings subtly changed. It became a general term for several genetically similar, top-quality hops rather than the direct descendants of the hop selected by Mr. Golding. In the 1950s, Wye College selected some of these varieties and these are what are known as Golding today. The true names of the varieties are: Wye Cobb, Wye Early Bird, Wye Eastwell Golding and Wye Mathon. Confusingly, some of these varieties are even older than the original Goldings.

The other classic British hop, Fuggles, is a comparative newcomer, being first commercially available in the 1870s. While Goldings were often reserved for aroma additions and dry-hopping, Fuggles was a great all-rounder, being used for bittering, aroma and dry-hopping.

Farnham Whitebine from Surrey was another 19<sup>th</sup>-century favourite, praised for its flavour and valued even above East Kent Goldings. The last vines were grubbed up in 1929 after problems with disease, but the variety continued to be grown in Kent where it was called the Canterbury Whitebine. They're still grown today, but are often sold as East Kent Goldings. Mathon Whitebine is another name for this variety of hop.

Cobb, sometimes called Cobb Golding, which was first developed in 1881, is another variation on the Canterbury Whitebine. It's still grown, but in small quantities.

In the 20<sup>th</sup> century many new varieties of hop were introduced, often in an attempt to improve resistance to diseases and pests. Some examples (and the date of their introduction) that are still around today are: Brewer's Gold (1919), Bramling Cross (1927) and Northern Brewer (1934). All appear in recipes later in this book.

In brewing records, hops were often listed by their region of origin rather than variety. Hop-growing was concentrated in two areas of England: the southeast and the West Midlands. The main hop growing regions were, in descending order of importance: Kent, Hereford and Worcester, Sussex and Surrey. Kent was subdivided into Weald of Kent, Mid Kent and East Kent. Only tiny quantities of hops were grown elsewhere.

<b>Hop varieties by region in the 1930s</b>	
<b>region</b>	<b>main varieties</b>
East Kent (Canterbury, Faversham)	Goldings, Bramling, Cobb and Tutsham
Mid Kent (Medway valley, Maidstone to Tonbridge)	Fuggle's, Bramling, Tutsham, Cobb, Goldings, Tolhurst
Weald of Kent (Tonbridge to Sussex)	Fuggle's
Sussex	Fuggle's
Hampshire, Surrey	Fuggle's, Farnham Whitebine.
Hereford and Worcester	Mathon, Bramling, Fuggle's
Berkshire and Shropshire	Fuggle's, Goldings
<b>Source:</b> "Brewing Science & Practice" H. Lloyd Hind, 1943, page 391	

### North American hops

From the 1840s onwards American hops begin to appear in British brewing records. Initially they came mostly from New York State, which was the main hop growing region in the early 19<sup>th</sup> century. The variety grown was mostly Cluster.

Later in the 19<sup>th</sup> century, problems with disease and pests drove the hop industry west, to Washington, Oregon and California, where it remains today. Again, the favourite variety was Cluster.

After the 1860s truly enormous quantities of American hops were imported into Britain:

“One-fourth of our extraneous supplies of hops is now drawn from North America, where the culture seems largely on the increase. The hops from Canada and the States, in the opinion of the best judges, still exhibit the disagreeable flavour which renders them quite unsuitable for fine qualities of ales.”

"The Farmer's Magazine Volume the Twenty-Fourth", 1863, page 190.

British brewers weren't enthusiastic about the flavour of American hops and reserved them for early bittering additions. Their high alpha acid content meant that they could still be used after many years of storage – in rare as long as ten years, but commonly up to five years.

Canadian hops, usually from British Columbia, were sometimes used.

### Continental hops

There was a huge variation in the quality of hops from different European countries. Unsurprisingly, the high-quality noble hops from Bohemia and southern Germany were the best. Saaz and Spalter in particular were much loved. Saaz was frequently used as a dry hop, that is added casks when they were filled to provide extra hop aroma.

Belgian hops, usually called Poperinge in brewing records, weren't greatly valued, except for their cheapness. They were used primarily as bittering hops.

Hops from Alsace, presumably Strisselspalt, show up regularly, both before and after 1870 when the region moved from French to German control.

Other types that appear from time to time are Burgundy, Altmark (North Germany), Styrian and, in the 20<sup>th</sup> century, New Zealand.

## Sugar

If you're wondering why I haven't included sugar amongst the adjuncts, I've a very good reason. I'm following 19<sup>th</sup> century British practice. Rice, maize and other types of unmalted grain were classed as adjuncts, but sugar was called a malt substitute. Splitting hairs, you could say, but it does demonstrate the standing which sugar had amongst brewers.

Two main types of sugar were used: invert sugars and proprietary sugars.

## Invert Sugar

There were four standard types of invert sugar, identified by the numbers 1 to 4, No. 1 being the palest and No. 4 the darkest. They were extensively used from the 1880s onward. No. 1 and No. 2 mostly appeared in Pale Ales, No. 3 in Mild Ales and No. 4 in Porter and Stout.

The good news is that invert sugars made to the same specifications are available commercially. The bad news is that they are usually only available in quantities sufficient to brew hundreds of barrels. Even smaller professional British breweries can struggle to acquire it in suitable quantities. That's why I've included this next section.

## Making invert sugar

As brewers' invert sugars aren't easily available, making them yourself is probably the best option. It doesn't take a huge amount of ingredients or equipment. You'll need:

- cane sugar (not table sugar)
- citric acid
- water
- a candy thermometer
- a saucepan

This is what you do:

- For each pound of sugar you use, bring 1 pint of water to the boil.
- Switch off the heat and add the sugar slowly, dissolving it.
- Add 1 gm (quarter teaspoon) of citric acid per pound of sugar.
- Turn on the heat again (not too high) and set the alarm on the candy thermometer to 230° F.
- Stir frequently while it starts to simmer.
- When the temperature hits 230° F reset the alarm for 240° F.

- Heat slowly (the slower the better) until the temperature gets to 240° F.
- Lower the heat to keep at 240° F - 250° F.
- For No. 1 maintain at heat for 20 – 30 minutes.
- For No. 2 maintain at heat for 90 – 120 minutes.
- For No. 3 maintain at heat for 150 – 210 minutes.
- For No. 4 maintain at heat for 240 – 300 minutes.

The colours you're aiming at are:

- No. 1 12-16 SRM
- No. 2 30-35 SRM
- No. 3 60-70 SRM
- No. 4 275-325 SRM

SRM is a colour scale, No. 1 to No. 4 are types of invert sugar.

[Insert scan of SRM scale]

### Proprietary sugar

Brewing sugars were big business in the 20<sup>th</sup> century and the many competing manufacturers all had their own proprietary brands. In the main, they were mixtures of invert sugars and caramel. They were often designed for a very specific purpose, for example priming Dark Mild or adding to the copper to colour Stouts.

They present a real challenge when trying to recreate recipes that employ them. Most of the manufacturers no longer exist and they are no longer on the market. Trying to discover their composition is very difficult. I've substituted a combination of No. 3 invert sugar and caramel for most of them.

### Caramel

In the 20<sup>th</sup> century caramel was widely used for colouring and for colour adjustments, sometimes as a component of proprietary sugars, sometimes on its own. After WW I it was increasingly common for brewers to measure the colour of their beers and to have a specific colour standard for each one. Beers were often deliberately brewed slightly paler and then coloured up to the exact required shade with caramel.

### Adjuncts

Adjuncts are any source of fermentable material other than malted grains. The 1880 Free Mash Tun Act revolutionised the ingredients that brewers were allowed to use. From 1816 to 1847, the only materials a brewer could legally use were malt, hops, water and yeast. After 1847 sugar was also allowed, but in 1880 Britain's mash tuns were thrown open to anything that was fit for human consumption.

The immediate reaction was the use of large quantities of unmalted adjuncts, mostly in the form of rice or maize. A grist containing 10% to 15% corn was pretty typical during the 20<sup>th</sup> century, though some brewers, for example Whitbread, stuck to just malt and sugar.

## Corn

Corn was the most popular adjunct from the 1890s right through until the end of the 20<sup>th</sup> century. It was mostly used in flaked form, where it could be added directly to the mash. Some brewers, particularly in Scotland, preferred grits which required gelatinising in a cereal cooker in a step preceding the mash itself.

## Rice

Presumably because of its price, rice was only employed sporadically. Some brewers gave flaked rice a try soon after the Free Mash Tun Act, but soon switched to flaked corn. Where rice was used extensively in the late 19<sup>th</sup> century might come as a surprise: Germany. The Reinheitsgebot was only applied to the whole of Germany in 1906. Before then rice had been popular in North German Lagers, where it was prized for its delicate flavour and pale colour.

## Flaked oats

The main use of oats was in Oatmeal Stout, which was popular between 1900 and 1950. The quantities of oats used were often minimal, symbolic more than anything. Just enough that they could use legally put “oatmeal” on the label. The grist of Barclay Perkins Oatmeal Stout contained less than 0.5% oats.

A bumper oats crop during WW II prompted the government, which had total control over the food supply, to force brewers to use 10% oats in all their beers. It wasn't a popular move, as using oats presented certain challenges in the brewhouse. One was the greater volume of oats compared to barley, which could cause over-filled mash tuns. As soon as the requirement to use oats was removed, brewers stopped using it.

## Flaked barley

Only during WW II was flaked barley used to any great extent in British brewing. It was the result of government policy. Energy could be saved by not malting some of the barley crop and instead turning it into flakes.

Guinness uses flaked barley in their Extra Stout, but that's a fairly recent phenomenon, only dating from the 1980s.

## Water

The influence of water on the development of beer styles has been overstated, but some water profiles, particularly that in Burton, were vital to getting a type of beer perfectly right.

I've incredibly precise information on the constituents of some brewing water. The 19<sup>th</sup>-century obsession with Burton and its waters meant that many chemical analyses were performed on the well water of different breweries in the town. Barclay Perkins handily provided details of their water treatments in the inside cover of their brewing logs.



## Yeast

The modern home brewer is a lucky chap. So much is available to him, particularly with regards to yeast. When I first home brewed back in early the 1970s, you had two choices for yeast. Either you used the grotty, generic dried yeast sold in home brew shops, or you cultured it yourself from commercial beer.

The great news is that the original strain is commercially available for some of the recipes in this book. Whitbread and Fullers, for example. Though in the case of Fullers, the yeast sold is the current Fullers strain. When they moved from dropping fermenters (a two vessel system of fermentation) to conical fermenters in the 1970s they selected just one of the three strains that their pitching yeast contained.

In the past, brewers weren't quite so precious about their yeast strains. Edinburgh brewers regularly used each other's yeast. There are some years in the 1860s where William Younger almost never used its own yeast. The list of the sources of the yeast they pitched is like a directory of Edinburgh brewers. Perhaps the close proximity of so many breweries in the Old Town encouraged exchanges of yeast. The practice wasn't limited to Scotland, other brewers' names occasionally crop up as the source of yeast in London brewing records.

## Brewing techniques

There are four basic processes in brewing beer: mashing, boiling, fermentation and aging.

Mashing converts the starches in the grain into fermentable sugars. Boiling hops in the wort adds the bitter flavour and helps remove some solids which are precipitated out. In fermentation, yeast eats the sugars in the wort to create alcohol and carbon dioxide. Ageing allows the flavours to mesh and mellow.

### Mashing

Mashing techniques changed significantly during the period covered by this book, particularly during the 19<sup>th</sup> century. During the eighteenth century, three or four consecutive mashes, all at different temperatures, was the norm. The number of mashes was gradually decreased and eventually a single infusion mash followed by sparging became standard practice.

### Multiple mashes

In 1800, the way brewers mashed hadn't really changed much in a century or more except for the added control that the use of thermometers brought after the 1770s. Brewers performed multiple mashes—usually three or four—at different temperatures and there was no *sparging* (sprinkling the grains with hot water to remove extract left in the grains after the main mash). The technique of a single mash followed by sparging was first developed in Scotland and only spread to England from the 1850s onward.

Each successive mash was at a higher temperature. Typical strike heats were 166°F (°C), 186°F (°C), and 190°F (°C). Each *wort* was hopped and boiled separately before being blended in the fermenting vessel. This last point is very important, as it's crucial to the method of *parti-gyling* employed, where the worts were blended in different combinations to produce two or three beers. When a beer was being brewed entire *gyle*, all the worts were mixed together.

London brewers were still performing multiple mashes in the second half of the nineteenth century, though by this time they had been reduced to two. Each of the mashes was followed by a sparge. Typical strike heats were 156° (°C) for the first mash, and then a sparge at 190°F (°C), 180° F (°C) for the second mash, and finally a sparge at 190°F (°C).

### Single infusion

The single infusion followed by a single sparge seems to have gained hold earlier outside London—possibly because many had been more recently founded and had never adopted multiple mashing. Tetley of Leeds in Yorkshire already brewed this way in the 1850s. In Scotland, this had been the standard practice since the beginning of the century. It was north of the border that the technique of sparging was first developed and by the 1830s Scottish

brewers had abandoned multiple mashes.

### Underlet mashing

London brewers in particular were great proponents of *underlet brewing*, a technique that they employed from the 1870s right through until they closed in the 1970s. It could be combined with either multiple or single mashes. After the first (or only) mash had stood for 60 to 90 minutes, more water was added from the bottom of the mash, via the underlet. This was typically a much smaller volume of water than for the mash 20 to 30 percent—around 10°F warmer than the initial strike heat.

### Parti-gyling

Forget what you think you know about parti-gyling. The method employed in the nineteenth and twentieth centuries isn't what you'll find described in home brewing books. What they describe—using each running to produce a different beer—fell out of favour in the eighteenth century. It was replaced by a much more flexible and efficient method.

As mentioned previously, each wort was hopped and boiled separately. This last point is crucial, as it gave brewers total control over the starting gravity of their beers. As long as you had one wort stronger than the strongest beer you wanted to brew, you could combine the worts to provide beers of any gravity.

### Boiling

The way brewers boiled had a great deal of variation. There were differences over time and between regions and, most significantly, depending on the type of beer being brewed. In addition to the various techniques of boiling, the equipment employed also varied.

London Porter brewers preferred large domed, or sealed coppers. These allowed pressure to build up inside the boiler which accelerated Maillard reactions and darkened the wort. Burton Pale Ale brewers on the other hand used open coppers because the last thing they wanted was to add any extra colour. They were aiming to produce as pale a beer as possible.

One unusual technique practised by some brewers, notably Barclay Perkins, was adding black malt to the copper during the boil. It was only ever done for Porter or Stout and was presumably to extract colour.

### Fermentation

As with boiling, fermentation techniques were many and varied, and somewhat regionally based. The process was divided into two parts: primary fermentation, where most of the conversion of sugars into alcohol took place; and cleansing, where the yeast was removed from the wort. Most of the variations in technique and equipment were concerned with cleansing, such as pontoons in London, Yorkshire squares in Yorkshire, and union sets in Burton-on-Trent.

"Unions are noted for the clean tasted beers they give; pontoes are most fitted for porter and stouts, while a skimming system is specially adapted for stock beers."

—*The Art of Brewing* by Frank Faulkner, 1876

### The dropping system

In the dropping system, fermentation began in tall, narrow, cylindrical vessels called *rounds*. After a period of fermentation in the rounds, which could last from one to three days, the wort was dropped into the shallow square vessels called *settling squares* where fermentation was completed. Dropping served two functions: The first was to remove some of the yeast, which was left in the round from the wort; the second was to aerate the wort and reinvigorate the fermentation.

The system was most popular in the South of England, but fell out of favour after World War II as brewers tried to simplify their production methods. Fullers used it until the 1970s. Wychwood still brews the Brakspear beers this way today and they may well be the last brewery performing dropping. After the original brewery closed, the dropping sets were moved to the new premises, as they were considered essential for maintaining the distinctive character of Brakspear's beers.

### Pontoes

*Pontoes* was the most popular system of cleansing beer of yeast in London in the nineteenth century. They were single barrels, placed on *stillions* into which yeast was expelled through the bung hole. The casks were kept full by refilling by hand with wort, which had been expelled with the yeast. The casks had a capacity of between 10 and 20 barrels.

### Yorkshire square

As the name implies, this was a method of fermentation popular in the northern county of Yorkshire, though there were also breweries in the Midlands that used it. The fermenting vessel, traditionally made of slate, now often of stainless steel, is divided into two chambers one above the other. Every few hours, wort is pumped from the lower chamber to the upper, from which it drops back down, leaving some of the suspended yeast in the upper chamber. Several Yorkshire breweries still have these fermenters, notably Theakston and Black Sheep.

### Loose pieces

Half way between pontoes and a union system, "loose pieces" were cleansing casks placed on their sides on stillions, but not attached to each other as union casks were.

### Burton Union

A more sophisticated development of the ponto system is the Burton Union. The casks in which cleansing occurs are fixed together on a *gantry* and topping up takes place automatically by way of a trough in which yeast and wort collect after being ejected via a swan-necked pipe. Only the second phase of fermentation happens in the union set—the first

phase being in conventional open fermenters. Burton brewers used surprisingly small rounds (round fermenting vessels), holding just 70 or 80 barrels.

The system wasn't limited to Burton. The enormous success of Burton Pale Ale led brewers in other parts of Britain to imitate Burton brewing techniques. Dozens of breweries installed union sets, though these gradually disappeared during the twentieth century, as they were difficult to clean and expensive to maintain. William Younger had several union sets in their Holyrood Brewery where they made most of their Pale Ales. Currently Marston's in Burton is the only brewery with an active union room.

## Ageing

During the 1800s, many beers were still aged before sale, though one of the innovations of the latter half of the century was a new class of running, or unaged, Pale Ales. These gradually displaced the Stock versions which were aged for several months. By the time World War I rolled around, only a few Burton Pale Ales were still aged.

The aged flavour, derived from a long, slow *brettanomyces* secondary fermentation, fell out of favour at the end of the nineteenth century and ageing was reserved for a few very special beers, such as Barclay's Russian Stout and Benskin's Colne Spring Ale.

After all the simple sugars had been consumed, normal yeast had nothing left to eat and primary fermentation ceased. That's when *brettanomyces* yeast, which was usually lurking in the equipment rather than being pitched, took over. It slowly worked through the more complex sugars providing carbonation and adding the classic "aged" flavour.

## Vatting

Bulk ageing in huge vats had been one of the innovations of Porter brewing. The vats of the large London breweries were awe inspiring.

"The late Mr. Boswell, in his Journal, relates, that Dr. Johnson once mentioned that his friend Thrale had four casks so large that each of them held 1,000 hogsheads [64,800 US gallons]. But Mr. Meux, of Liquorpond-Street, Gray's-Inn-Lane, can, according to Mr. Pennants, shew 24 vessels containing in all 35,000 barrels [1,512,000 gallons]; one alone holds 4,500 barrels [194,400 gallons]; and in the year 1790, this enterprising brewer built another, which cost £5,000, and contains nearly 12,000 barrels; valued at about £20,000. A dinner was given to 200 people at the bottom, and 200 more joined the company to drink success to this unrivalled vat."

"Arithmetical questions: on a new plan" —William Butler, 1811

Stock Ales were also vatted, but in much smaller quantities than Porter. The market for Stock Ale was too small for it to be aged on the same scale as massively-popular Porter. After 1870, when aged Porter fell out of fashion, London brewers removed their large vats and only retained a few smaller ones for Stock Ales.

## Trade casks

The classic Burton Pale Ales were brewed as Stock Ales and were stored for long periods

before sale. But, unlike Porter, Pale Ale was aged in trade casks—the barrels in which it would be shipped to the customers. The method of ageing was particularly counter intuitive—it sounds designed to spoil beer. At Bass the full barrels were piled up in the brewery yard exposed to the elements where they were left for 8 or 9 months. Their only protection was a layer of dampened straw in particularly hot weather. The harsh treatment supposedly left the finished beer remarkably tolerant of fluctuations in temperature.

### **Priming and conditioning**

The vast majority of the beers mentioned in this book were sold as draught beers. To be more precise, they were packaged as cask-conditioned beers. Filled unfiltered into casks, they generated their own carbonation through a short secondary conditioning. From the late nineteenth century onward, it was common to prime the casks at racking time with a high-gravity sugar solution. This would provide the sugars for the yeast left in the beer to work on. The primings were also sometimes the source of some of the beer's colour.

### **Bottling**

Before 1900 only limited quantities of beer were bottled. There was usually an extended period of secondary conditioning in cask before bottling, during which the beer, if it had been brewed properly, dropped spontaneously bright. Carbonation was achieved through bottle conditioning.

After 1900, brewers began to adopt the American method of producing bright, non bottle-conditioned beer. This was called “chilled and carbonated” or just “carbonated” beer, in reference to the process by which beer was chilled to kill off yeast activity then artificially carbonated with CO<sub>2</sub>. It allowed breweries to market beer without any sediment, a big selling point if old advertisements are anything to go by.

Certain types of beer, notably the top-quality Pale Ales of Bass and Worthington, continued to be bottle-conditioned well into the 20<sup>th</sup> century. Guinness Extra Stout was bottle-conditioned until the 1980s.

## Notes on the recipes

Before we get to the meat of the book, I'd best tell you a few things about the recipes that appear in the following chapters. I've tried to make them as true as possible to the originals, but there are times when certain details are lacking in the brewing records. This chapter explains what I've done in those cases and why.

There are a small number of recipes which were not taken from brewing records directly. Those are clearly identified as such. All the others are based on my analysis of the original brew-day document.

## Ingredients

These present a few challenges, mostly with coloured malts. As I mentioned earlier, there was a huge variation in the character and colour of brown and amber malt. Attempting to exactly match the one in the original recipe is a hopeless task, even if you make the malt yourself. Using what's available is really your only option.

Crystal malt offers the same difficulty. In brewing records it's just records as crystal malt, with no indication of its colour. The one I specify in the recipes is just a guess. Feel free to change it if you think I've got it wrong or another type is more readily at hand.

## Mashing

I've simplified the mashing schemes to a single infusion followed by a sparge. That's not the way most of the beers were originally brewed. Before 1860, most beers from London had multiple mashes, sometimes combined with sparges, but sometimes not.

The different methods can be classified like this:

- multiple mashes alone
- multiple mashes with sparges
- two mash, underlet and two sparge
- single mash, underlet and sparge
- single mash and sparge

For those who would like to go the whole historic hog, I've included brief details of the original mashing scheme.

One note on the temperatures in the recipes. Those given for mashes and underlets are the initial heat, for sparges the strike heat.

## Boiling

Many of the original brews had much longer boil times than home brewers usually perform. Two, three or even for hours were not that uncommon, especially for Porter and Stout. In

general I've reduced it to just 90 minutes, really just for your convenience.

There are cases where a long boil was an important part of the brewing process. The runnings from the third and fourth mashes of Porter brews were boiled for extended periods, up to four hours. The purpose seems to have been twofold. First, to concentrate a wort to raise its gravity. Second, to darken the wort's colour.

The first isn't so relevant if you're home brewing. You don't need to worry about wringing the last few ounces of extract out of your grains. The second is more relevant, especially in early 19th-century recipes where a significant amount of colour seems to have come from the boil.

## Hop additions

Almost no brewing records contain details of hop additions. In the rare occasions where they do, I mention it in the text accompanying the recipe. For the vast majority, I've had to make an educated guess. That guess is based upon descriptions of typical hopping schemes in old technical manuals.

Feel free to play around with the additions as you see fit. They are only guesses and there is no correct answer, as the information has been lost. There are a couple of points to bear in mind. Very late additions are a modern technique. Where additions have been records, the last is no later than 30 minutes.

## Colour

Many of the beers from after WW I were colour adjusted by the use of caramel at racking time. This is particularly true of Mild Ales, but many Bitters were also darkened, albeit not to the same extent. This means that, as brewed, the beers aren't dark enough. To match the colour as it would have been in the pub, you'll need to adjust with caramel yourself.

It's easy to spot recipes where this is true – I've included caramel in the ingredients, but without a quantity. The idea is that if you want to match the colour of the original, you simply add enough caramel to hit the SRM number in the recipe. The amount you'll need to add will vary depending on the colour of the caramel, which is why I've not filled in a quantity.