

Vinegar: its manufacture and history in London.

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Introduction

For many people vinegar is a rather prosaic product, sprinkled with abandon on fish and chips. Unfortunately the first thing wrong with this view is that the product often served by fish and chip shops is not in fact vinegar at all but a product known as non-brewed condiment (NBC). NBC is made by diluting edible-grade acetic acid (originally obtained from the destructive distillation of wood as pyroligneous acid but now mainly a product of the petrochemical industry) with water and adding caramel as a colouring agent. While it is wholesome and has the essential ingredient (acetic acid) that gives vinegar its acidity, it lacks the numerous characteristic flavour and aroma compounds derived from the raw materials and the complex biological process by which vinegar is made. Non-brewed condiment's rather cumbersome name results from a series of court cases pursued by the manufacturers of vinegar that went all the way to the House of Lords (*Kat v Diment* 1950, IKB 34) to protect their business against this cheaper competitor. As a result, anything described as vinegar can only be the product of a double fermentation process – the first (alcoholic) in which sugars are fermented to ethanol by yeasts and a second (acetous) performed by bacteria which oxidise the ethanol to acetic acid – the compound that gives vinegar its characteristic tang. NBC cannot therefore even be described as artificial vinegar or non-brewed vinegar.

Since the first stage of vinegar production is an alcoholic fermentation, it is probably a fair assumption that vinegar and alcoholic beverages were discovered at about the same time. Unsurprisingly, far more attention has been devoted to delineating the history of alcoholic beverages than vinegar, although in ancient times there may often have been little to choose between them in terms of taste. In fact other authors have noted the lack of precise definitions in ancient texts and the difficulty of distinguishing between terms such as wine, old wine, sour wine and vinegar. The brewing of beer and wine in the ancient Middle East were well known and Egyptian vinegar was esteemed by the Greeks and Romans at a later date. There is the well known story of Cleopatra, in an early example of conspicuous consumption, drinking pearls dissolved in vinegar. Vinegar could have reached Britain around the first century BC when it was known to be in use by the Celts along the Atlantic coast of France. Initially this was produced from wine – the word vinegar itself reflects this origin coming from the French *vin aigre* – sour wine. When malt vinegar was produced later it was known, by analogy, as *alear*, although this term has long since died out.¹

In the 1820s adulteration of vinegar with sulphuric acid was one of the many malpractices exposed by Frederick Accum in his book, *A Treatise on the Adulteration of Food and Culinary Poisons*. It was still commonplace nearly 40 years later when Hassall reported in 1857 that “some of the vinegars sold at small hucksters shops and oyster stalls consists of little else than diluted sulphuric acid and water coloured with burnt sugar”. Although addition of 0.1% sulphuric acid to vinegar was permitted Hassall's Analytical Commission found levels well in excess of this in a number of samples including vinegar produced by Beaufoy & Co. but very little in that produced by Pott & Co. of Southwark.

These and subsequent investigations, sponsored by the journal *Lancet*, led directly to the introduction of the first British Food and Drugs Act in 1860.²

Uses

Although small amounts may still be used in domestic applications as a cleaning agent or an antiseptic, almost all the vinegar produced nowadays is used for food purposes. We are mostly familiar with it as a condiment but in fact UK production of vinegar amounts to about 1.5 litres (0.33 gall.) per person per year – far more than is ever sprinkled on chips. The vinegar we consume is mostly hidden in a huge range of manufactured products such as pickles, sauces, salad dressings, coleslaw etc.

The traditional use of vinegar in pickling to preserve otherwise perishable foods relies on the antimicrobial activity of the acetic acid to kill the normal spoilage microorganisms. It is probably for the same reason that it has been traditionally used as an antiseptic and a treatment for sore throats. Certain vinegars such as cider vinegar and rice vinegar also enjoy a considerably broader, but generally unfounded, reputation for all sorts of beneficial effects against a wide range of ailments.³

Vinegar was the strongest acid known in antiquity. It was reportedly used as an alternative or adjunct to water in 'fire-setting' where large rocks to be cleared were heated and then rapidly cooled. An often cited example of this use was by Hannibal when crossing the Alps on his march on Rome and there are independent accounts of its use in China. During the Middle Ages verdigris (a basic acetate of copper) was made by moistening metallic copper with vinegar and exposing it to the air.

One important industrial application was in the manufacture of ceruse or white lead, a paint pigment. In the Dutch or stack process, sheets of lead were laid on top of earthenware pots containing vinegar. The pots were sunk in a layer of horse manure or spent tanning bark to keep them warm and supply the carbon dioxide which, with the acetic acid fumes, converted the lead to white lead over a period of about 8-16 weeks. At the end of this period the white lead was scraped off, washed, recrystallized and dried. By laying boards over the lead sheets another layer of manure and pots could be added and a stack built up. In the 18th Century one English manufacturer had stacks containing 1600 pots and 4 tons of lead.⁴

Vinegar: methods of manufacture.

Vinegar can be made from practically any alcoholic raw material - beers, wines, spirits, and cider and the vinegar in a locality often reflects the traditional alcoholic beverage. For example malt vinegar in the UK, wine vinegar in continental Europe, rice vinegar in Japan, palm sap vinegar in many South and Southeast Asian countries. In the beginning, its production must have been intimately associated with industries producing alcoholic beverages. Malt vinegar brewers would have obtained their feed material from nearby breweries in the form of unsold or poor quality beer. This may well account for the frequent proximity of the two activities, for example the location of Pott's vinegar brewery near the southwest corner of the Anchor Brewery in Southwark. With improvements in the brewing process the availability of reject ale would have become increasingly unreliable and so vinegar brewers would have had to resort to producing their own alcoholic feedstock, known as gyle.

Not surprisingly therefore there are close similarities between the two processes. To produce alcohol from barley it is necessary first to convert the barley carbohydrate, present as starch, into a form that is fermentable by yeast. This is achieved by malting the barley, a process in which the barley is germinated to produce enzymes in the grain that will break the starch down to fermentable sugars such as glucose and maltose. The malt is ground, mixed with unmalted barley flour, and treated with hot water in a process known as mashing in which the starch is broken down and the soluble sugars produced are extracted. In vinegar brewing this extract known as wort is fermented directly by adding yeast. This differs from beer brewing where the wort is boiled before fermentation and hops are added. Boiling the wort will inactivate the starch degrading enzymes leaving unfermentable dextrins present. These and hop oils extracted during boiling are important to the beer brewer as they confer characteristic qualities to the beer but the vinegar brewer simply wants the maximum conversion of starch to sugar and sugar to ethanol. The more alcohol that is present, the more acetic acid he can produce and therefore the more vinegar.

The second stage is known as *acetification*, or the acetous fermentation, and produces the vinegar as we know it. During acetification bacteria, described as acetic acid bacteria, oxidise the ethanol to acetic acid. Unlike the alcoholic fermentation, acetification requires the presence of air and the key difference between the different methods of acetification is the way in which they bring the three components: alcohol, bacteria and air together.^{1,3,5}

In the simplest process, the acetic acid bacteria grow as a surface film on the acetifying liquid. This is generally known as the Orleans process, after the French centre of vinegar making. At its simplest, the alcoholic liquid is added to large casks laid on their sides with the bung hole open but loosely covered with something like a tile so that air can get in. The bacteria grow as a surface film oxidising the alcohol to acetic acid. When the acidity has reached the appropriate level, the vinegar is then removed for further processing such as filtration and bottling. This simple process can be refined and improved by a number of modifications. For example, air circulation can be increased by drilling holes in the end faces of the cask (above the level to which the barrels are filled). When the process of acetification is deemed complete, rather than replace the whole contents with fresh gyle, only a proportion of the liquid in the barrel is removed and replaced. This has a number of benefits: it helps conserve the film of bacteria in the cask, it ensures that the contents always have a reasonable degree of acidity to prevent contamination with other microorganisms, and the process operates over a narrower range of conditions and therefore more efficiently.

The casks can be stored in a building which may be heated thus ensuring a relatively constant warm temperature at which the bacteria can operate more rapidly. The Orleans process described by Mitchell was conducted inside.³ George Dodd in his description of a visit to Beaufoy's describes two processes "fielding" and "stoving".⁶ They appear to differ essentially only in the fact that the former occurs outside and is subject to the vagaries of climate while the other occurs inside and therefore operates more uniformly and efficiently (Figures 1 and 2).



Figure 1 "Drawing off" – a vinegar field (from George Dodd: *Days at the Factories*. 1843)

Acetification proceeds best at temperatures above 30°C. It would slow as the temperature decreases below that and cease entirely when it drops below about 8°C. Casks left exposed to low temperatures and wide daily fluctuations would take long and unpredictable times to complete an acetification.

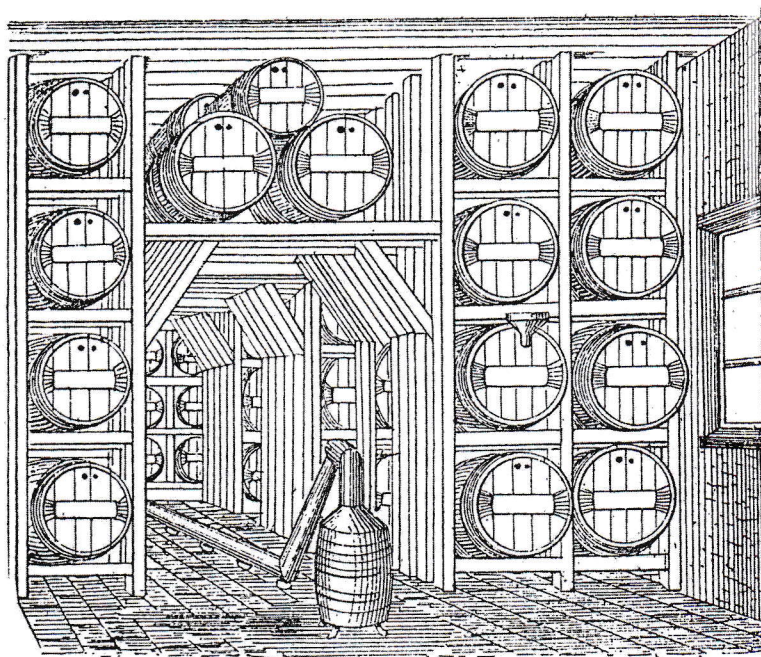


Figure 2 Manufacture of wine vinegar by the Orleans process (from C. Ainsworth Mitchell: *Vinegar: its manufacture and examination*. 1916)

The more advanced 'quick vinegar process' achieves much faster rates of acetification by increasing the area of contact between the bacteria, the alcohol in the gyle and the oxygen in the air. The bacteria grow as a surface film on an inert support medium packed in a false bottomed tower or vat, known as a vinegar generator or acetifier vat. Traditionally beech wood shavings or birch twigs have served as the inert support but numerous other materials have been used including coke, corn cobs and sugar cane bagasse. The gyle is sparged over the surface of a bed of support material and trickles down against a counter current of air drawn up through the bed by the heat of the oxidation reaction occurring within it. The liquid collects in a sump at the bottom and, from there, is continuously recirculated through the bed until the acetification is complete. At this stage a proportion of the finished vinegar is removed and replaced with fresh gyle (Figure 3).

The quick process is attributed to Schützenbach who introduced it into Germany in 1823. A British patent was issued to Ham (British Patent No. 5012) in 1824 describing all the principal features of the quick vinegar process but it did not entirely supplant the older process in England until about 1860.¹

Some anticipation of the quick vinegar process can be seen much earlier in a report in the *Philosophical Transactions of the Royal Society* for 1670 on *The Way of making Vinegar in France, Communicated to the Publisher by an Ingenious Physitian (sic.) of that Nation...* who noted the use of grape stalks and vine twigs packed into two casks – one half filled with wine, the other full. Every day half the contents of the full cask was removed and added to the half full one. The onset of acetification is signalled by the heating up of the half full vessel after two or three days and the process was complete, in the summer months, within fifteen days.⁷ It is interesting, and a little confusing, to note that Dodd's description of filtration of the vinegar at Beaufoy's is also a reasonable description of the quick vinegar process and one is tempted to suggest that this, or some hybrid of it, was what he saw rather than just a filtration process.

The quick vinegar process was in use at the Sarson's vinegar brewery in Tower Bridge Road until its closure. The process had been refined over the years so that it worked incredibly efficiently. The vinegar generators were packed with wood wool, very high temperatures were maintained (40-43°C) and the air was actively pumped and metered rather than relying on the natural flow. At its best the Orleans process could produce vinegar in about 14 days, the quick vinegar process in about 4-5 days.

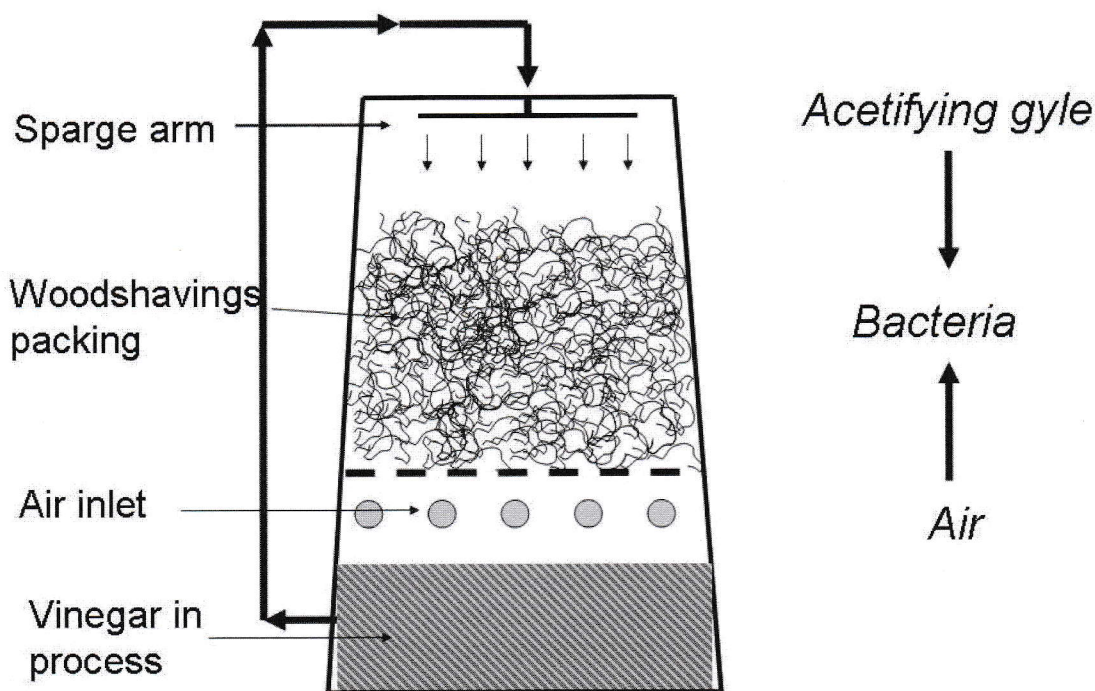


Figure 3 The quick vinegar process

The most modern method used, which takes 1-2 days, is known as submerged acetification. The bacteria are freely suspended in the liquid gyle and air is introduced at a high rate to agitate the mix and maintain a good supply of oxygen. This is essentially the same procedure as is used in other modern fermentation processes such as antibiotic production. The process requires less space than the more traditional methods, although it could not better the overall process efficiencies achieved by the quick vinegar process as operated at Sarson's.

Following acetification vinegar was allowed to mature in oak vats for up to nine months. It was then brightened by filtration and, in the case of malt vinegar, coloured by the addition of caramel. Sometimes filtration involved trickling through another vat containing grape stems. Such vats were known as rapes and were the forerunner of the acetifying vats used in the Quick Process. Vinegar can also be distilled to produce a water white product. This is a relatively minor product in England and Wales though more popular in Scotland. It is not the same as spirit vinegar, which is also water white but made by acetification of ethanol that has been purified by distillation.

Vinegar can be made with acetic acid contents up to 10%-15% but is usually diluted down for sale. The minimum standard for the acetic acid content of vinegar in most countries is 4%. In the EU wine vinegar must contain 6% and most table malt vinegar contains 5%. (Higher strength vinegars can be used in pickling to allow for the dilution effect of water in the material to be pickled.)

The length of time required to produce vinegar meant that manufacturers always had a large amount of capital tied up in stock (see cover illustration).

The Vinegar Industry in London⁸

The London area, and particularly that part south of the river in the historic county of Surrey, was the main area for vinegar making in the British Isles. The modern London street atlas lists just one Vinegar Yard, in Bermondsey, but early nineteenth century maps show several small alleys and courts so named. In 1763 there were six vinegar manufacturers in London. By 1833 this had risen to eight, and in 1844, when excise duty on vinegar was abolished, there were eleven. (Excise duty was first imposed on vinegar in the reign of Charles II.) By 1900 there were twelve, but subsequent takeovers and mergers reduced the number of vinegar works to nine in 1920 and just two in 1940: one in South Lambeth, the other in Bermondsey. But those two were producing more vinegar than had been made by 65 licensed vinegar makers throughout the country in 1845.

Before the seventeenth century vinegar making appears to have been small scale, possibly associated

with the brewing of beer, perhaps just for the use of the immediate family. The first commercial vinegar maker was probably Samuel Rush, whose yard in Castle Street, Bankside was established in 1641. This vinegar yard grew in importance, so that when it was taken over by John Pott in 1790 was the largest producer of vinegar in Britain. John Pott & Son had been making vinegar in Whitechapel by 1766. In 1833 C A & W Pott were still making substantial quantities of vinegar, the third largest vinegar brewers, but the firm slowly declined throughout the nineteenth century. In 1900 Pott's were bought out by Beaufoy's.

Mark Beaufoy (1718-1782), a Quaker, was born in Bristol. His father, also Mark, was a brewer who married Elizabeth, daughter of the Pontypool ironmaster, Capel Hanbury. In 1734 Mark junior was apprenticed to Joseph James, a distiller in Bristol. He became a partner in the firm in 1741. Later Beaufoy moved to London and, in 1762 he took a lease on Cuper's Gardens, a disused pleasure garden by the river in Lambeth. Here he began making vinegar. To provide himself with rapes for the filtration process, Beaufoy steeped raisins in water, discarding the liquor. At the suggestion of the Quaker physician and botanist, Dr John Fothergill, he started using this 'raisin juice' to make British wine, also known as 'sweets'. Cuper's Gardens, on land owned by the Earls of Arundel, had been established as pleasure gardens in the late seventeenth century. Nearby, Beaufoy built cottages for his workers, appropriately named Friends Row. By 1780 the firm was rivalling Potts in the quantity of vinegar produced. On the death of Mark, the brewery was taken over by his son, John Hanbury Beaufoy, and his nephew, Henry Benjamin Hanbury Beaufoy. The southern approach to Waterloo Bridge (built 1811-17) crossed the Cuper's Gardens site. So Beaufoy's moved to South Lambeth Road. In 1929 they merged with Grimble's to form Beaufoy Grimble & Co, which became part of British Vinegars Ltd in 1932.

Also in Lambeth was the firm of Sir Robert Burnett & Co at Vauxhall. Sir Joseph Mawbey & Co established this vinegar works by 1763. In 1778 it was taken over by a T Fassett, who supplied 25% of the Royal Navy's vinegar during the Napoleonic Wars. Beaufoy, Pott and Champion supplied the rest. Robert Burnett went into partnership with Fassett in 1808, and two years later the firm was styling itself Robert Burnett & Sons. In 1910 the firm was taken over by Hills, Son & Underwood of Norwich. Besides making vinegar the firm also made Burnett's White Satin Gin, which became very popular. The firm was bought out by the Distillers Company Ltd in 1928, the Hills & Underwood name and goodwill being sold to Beaufoy Grimble in 1929.

The only other major Victorian vinegar manufacturer in London to be established before 1800 was Champion. There was a vinegar yard in Clerkenwell in 1710, and this was being run by one James Calvert by 1763. By 1776, his son, James Calvert jnr, had established a vinegar works in Old Street. This became Champion's works. The Champions sold out in 1838 but the name was kept, become Champions Ltd in 1881. In 1907 the works was sold and production was moved to Bermondsey, the firm having merged with Slee's as Champion & Slee.

Buy a bottle of 'Sarson's Vinegar' today and the label will tell you that Sarson's has been 'established since 1794'. Even Henry Sarson was unsure of the date. In 1794 Thomas Sarson was a drysalter. In 1822 Henry James Sarson was also listed as a drysalter, at 35 St Swithins Lane in the City of London. By 1831 he and his brother, James Thomas Sarson, were making vinegar at the Vinegar Ground, City Road.⁹ There is a story that John Sarson, who was in the carting business, provided haulage for Champions. But Champions broke the contract and began carting for themselves. This led to John establishing his own vinegar works nearby. This story cannot be substantiated. In 1850 Henry James Sarson (1825-1912), took over the company on the death of his father, James Thomas Sarson. Sarson's became a limited company in 1894, following Henry James Sarson's retirement. Initially it seems that the Sarsons made only 'wood' vinegar. Certainly Henry James Sarson never made malt vinegar. He bought in substantial quantities of malt vinegar from Hill Evans & Co of Worcester, which he presumably sold under the Sarson name. Sarsons began making their own malt vinegar in 1894. They produced both malt vinegar and 'wood' vinegar at their Catherine Street works. In 1913 the price for Sarson malt vinegar was 6d per gallon and for their wood vinegar, 3½ - 4½d per gallon. Sarson's was taken over by Crosse & Blackwell in 1929, and became part of British Vinegars Ltd in 1932. The Sarson name was retained as a trading name.

A detailed history of the vinegar brewery in Tower Bridge Road, Bermondsey, is given in the

accompanying article. Suffice it to say here that vinegar making was started in a small way by Slee, Vickers & Co around 1814. The works expanded after land purchases in 1825 and 1860. The Slee family were involved throughout the nineteenth century. The family firm became a limited company in 1895 and, as we have seen, merged with Champion in 1907. Champion & Slee were taken over by Crosse & Blackwell in 1929.

William Grimble and Sir Felix Booth, both gin distillers, built their vinegar works at Cumberland Market, to the east of Regent's Park, in 1840. It was at the end of an arm of the Regent's Canal, long since filled in. The firm became a limited company in 1889. In 1903 they opened another vinegar brewery in Leith, Edinburgh. In 1929 Grimbles Ltd merged with Beaufoy's.

There were a number of smaller vinegar makers in the London area. For example, in 1833 J C Baker and T Maskew had a small-scale operation in Bermondsey. William Linton was in Kates Lane. Another works was founded by W C Spitty in Sigdon Road, Dalston in 1880. The firm moved to larger premises in High Street, Homerton in 1913 and became a limited company in 1917. In 1938 they were bought out by British Vinegars Ltd.

In 1932 Beaufoy Grimble, together with the vinegar-making interests of Crosse & Blackwell and Distillers Company merged with other provincial vinegar makers to form British Vinegars Ltd. Several other smaller vinegar makers were swallowed up by this combine in the ensuing years. Eventually British Vinegars Ltd became part of the Nestlé group, but has since been 'de-merged' and 'Sarson's Vinegar' is now made by Premier Ambient Products (UK) Ltd of Long Sutton, Lincolnshire.

The Ninth Report of the Commissioners of Excise, published in 1834 [PP1834 XXV] gives some details of the industry as it was in 1833. It shows just how much larger the major vinegar makers in London were than their provincial counterparts. Six of the works in London produced Excise revenues in excess of £1000. Only John Waddington of Birmingham and Richard Squire of Norwich reached that figure. Interestingly, Sarson was not listed, lending weight to the suggestion above that they made only wood vinegar before 1894.

In the early nineteenth century there was an Association of London Vinegar Brewers whose aim was to maintain prices. When this broke up around 1816 aggressive price-cutting ensued and prompted an abortive attempt to revive the combination in 1818. Another trade association, not restricted to London vinegar brewers, was formed in 1838, known as 'the Club'. Again the intention was to maintain prices and some rates became known as 'Club Prices': a term still in use as late as 1890. The Association was again revived in 1900. Competition, especially from the cheaper alternative, diluted acetic acid continued, leading to family firms becoming limited liability companies and eventually the mergers of the 20th century.⁷

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