

What's your poison?

Alan Gall

The use of arsenic in domestic preparations has a long and interesting history. It once featured prominently in everyday life with applications ranging from cosmetics that damaged blood vessels (favoured by prostitutes for inducing nice rosy cheeks) to cure-all quack medicines. For example, a dilute solution of potassium arsenite was commonly recommended as a tonic. Under the name of Fowler's Solution it sold from the 1780s until almost modern times. Charles Frederick Hyde, a brewer at Chesters Brewery Company in Manchester, noted in his diary for 16th January 1890: 'Went to the city and paid

a guinea to Dr Little for examination and another 6 shillings for specs ... no disease whatsoever in the eyes and advised me to continue the use of arsenic for scurvy.' Little did he know that ten years later the toxicity of an arsenic compound would cause much anguish for fellow brewers, and considerably more so for their unsuspecting customers.

The first hint that something unusual was happening seems to have been noticed sometime after June 1900 by Dr Ernest Septimus Reynolds at the Manchester Workhouse Infirmary. There, a number of patients were admitted with very similar

CAPSULÆ FERRI et HÆMOGLOBIN. ET ARSENIC.

Each Capsule contains:—

Blaud's Pill	gr. v.
Hæmoglobin	„ iii.
Arsenious Acid	„ $\frac{1}{10}$

This excellent prescription combines the alterative properties of Arsenious Acid with the chalybeate properties of Iron in both the inorganic and organic state. The Capsules form a useful tonic, and are particularly valuable and convenient for the treatment of *Anæmia* and *Chlorosis*.

Price, 1/8 per 100; 14/- per 1000.

Figure 1. Arsenic based tonic advertised by James Woolley & Co Ltd in 1911

symptoms in varying degrees; paralysis of the limbs, change of skin colour, loss of memory and cirrhosis of the liver. Alarming, the number of cases began to increase significantly towards the end of the year. The localities particularly affected were the Manchester districts of Ancoats, Hulme, and Miles Platting; also Ashton Old (and New) Road, and Lower Broughton in Salford. At first the symptoms were puzzling, until Dr Reynolds arrived at the correct conclusion - they were all suffering from arsenic poisoning, and this had come from drinking beer.

Breweries had been promoting the idea that beer, if drunk in moderation, was good for health. 'Beer can kill you' was clearly an undesirable message to be sending out to consumers, so the Manchester Brewers Central Association quickly commissioned a report by a team of experts. James Niven, Manchester's Officer of Health, also began compiling his own report.

The brewery-sponsored commission reported back on 15th December 1900. Having examined all the basic ingredients used at the local breweries (apart from, apparently, malt) the finger of blame pointed firmly at a manufacturer in Liverpool called Bostock & Company, who had supplied contaminated brewing sugar. During the production of invert sugar, they had used an arsenic-containing sulphuric acid bought from John Nicholson & Son, a chemical manufacturer in Leeds. The commissioners were at a loss to explain why Bostocks would use

such a product when it should have been obvious that a pure acid was necessary. Incompetence seemed the likely answer, as there was no significant commercial gain to be had from buying the slightly cheaper version.

Sulphuric acid can be manufactured either by the lead-chamber process or the contact process. The lead-chamber method was the version exclusively in use by British producers at the time that Nicholson & Son operated. There were four principle sources for the sulphur dioxide required in the process: sulphur, iron pyrites, zinc sulphide and 'spent oxide' from gas works. Arsenic-free acid could be made directly using suitable sulphur (such as that mined in Sicily) but the main raw material used was the more abundant iron pyrites, found in combination with arsenic. The resulting product from Nicholson's works, if sent out unpurified, contained around 2% of the contaminant, measured as arsenious acid. Bostock's chemist failed to recognise that something had changed in the quality of the sulphuric and so it was used to invert sucrose to 'brewer's sugar' with tragic consequences.

There was even some suspicion that Bostocks has allowed the same thing to happen before, perhaps from about 1896, but at contamination levels too low to be obvious.

Unable to prosecute the suppliers directly, Manchester Council decided to punish the pub landlords, saying: 'The

Sanitary Committee were, moreover, able to secure a number of convictions against retail dealers, which was the only vindication of the law open to us'. The Sale of Food and Drugs Act of 1875 provided the legislation for legal proceedings.

Employees of some breweries (especially those who made full use of their beer allowance) were particularly at risk. Nearly the whole workforce at one of Manchester's larger concerns showed symptoms of the poisoning. 'For some time the men have been affected by los-

ing alternatively the use of their arms and legs and have shown dropsical tendencies. In one case the sufferer turned the colour of a mulatto, whilst his skin is scaling off.'

Without access to the original information on the origin of the beer samples, it is difficult to name all the breweries that sold the arsenical beer. Some can be identified from newspaper reports: Richard Seed & Co of Radcliffe, Groves and Whitnall of Salford, Hamer's Brewery of Bromley Cross, North Cheshire Brewery Company of Macclesfield,



Figure 2. If local legend is true, brewers Groves & Whitnall dumped contaminated beer into the River Irwell.

Threlfalls of Liverpool and Salford. It is known from a published company history that the Cornbrook Brewery (which stood on Chester Road in Manchester) was also one to suffer. Others were able to boast that they had received a clean bill of health. Boardman's brewery of Ancoats, for one, proclaimed their beers to be arsenic free because they used only malt and hops without any added brewing sugar. Two Ormskirk based brewers sent samples of beer to the West Drayton Laboratories for analysis and their initiative was rewarded with an upsurge in sales when drinkers were assured of a safe product. Clearly, trade would have been badly damaged for those who had used Bostock's sugars and in addition there was the considerable quantity of beer that must have ended up down the drain. Having said that, the local brewers managed to weather the storm. There were approximately 35 breweries in Salford & Manchester at the start of 1900 and two years later it was much the same figure. 1903 saw a few take-overs and closures but other factors may have been involved.

The effects of the incident were not confined to the south of Lancashire. At Market Drayton one company decided to dump 25000 gallons of beer and in the city of Chester 500 barrels were emptied into the sewers by another firm. In their annual report for 1901 the Burton Brewery Company, whose trading area covered mainly Derbyshire, Staffordshire and Leicestershire, blamed a loss of customer confidence as one factor in declin-

ing sales. Alarm even reached London, although the *News of the World* was able to reassure its readers that 'Those who quench their thirst in the City may rest assured that they have a competent guardian in Dr Sedgwick Saunders.' The good doctor had arranged for the local brews to be tested and was quoted as saying: 'The samples we have obtained we shall examine, but in relation to the prospective result it may at once be explained that, for the greater part, City beers are supplied by the better class of brewers.'

The government reacted to public concern by appointing a Royal Commission that sat at the Westminster Palace Hotel in London. All the investigative work had been done by others but the Commissioners dutifully interviewed those 'on the ground' to provide material for their report. It emerged from the testimony of James Niven that at least 2000 cases of poisoning had occurred in his area over the previous six months.

A report by Salford's Medical Officer of Health in 1901 included some observations made by Dr Reynolds about the effect of arsenic poisoning on the mental state of the victims. 'Thus a totally paralysed patient who has been in bed for weeks when asked if he has not been for a walk this morning will say that he has ... and when asked about yesterday will perhaps say with a little prompting that he has been to the seaside.' It would seem that our Dr Reynolds was not averse to some light entertainment by making

improbable suggestions to his deluded patients.

One problem that investigators faced during the early stages of the outbreak was the lack of consensus regarding the best method for accurately determining arsenic concentrations. At Professor Delepine's laboratory in Manchester, Reinsch's test was adopted in preference to Marsh's or Fleitmann's, two other methods available before all such techniques were rendered obsolete by modern instrumentation. The Reinsch test involved depositing a film of arsenic on copper foil by boiling the beer with hydrochloric acid. Arsenic crystals were deposited inside a tube by sublimation from the copper foil. A comparison was then made under a microscope with the deposits formed from standard concentrations.

Following the outbreak, there was much talk about legislation to control the ingredients used in brewing. Of course, nothing happened. Dr Reynolds subsequently received recognition as the first person to identify the nature of the poison after writing a detailed paper for the *Lancet*, published January 19th, 1901. The Chairman of Watney's brewery, Henry Cosmo Bonsor, got to sit on the Royal Commission with such luminaries as Lord Kelvin, Sir W.S. Church, President of the Royal College of Physicians, and the Government Analyst, Professor T.E. Thorpe. The fishes in the River Irwell at Salford were given a supplement to their diet when Groves & Whitnall's brewery

reputedly flushed hundreds of gallons of beer into the murky water.

Note

I have used the spellings sulphur, sulphide and sulphuric throughout. The current I.U.P.A.C. recommendation is to use sulfur, sulfide and sulfuric and these forms have now been adopted by the Royal Society of Chemistry. The old spelling seems more appropriate for historical work.

Sources

The poisoning epidemic was reported in many local and national newspapers during 1900-1901. I have consulted several of these reports in conjunction with trade directories. Other sources are as listed.

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Thanks are due to Sue Hyde Fielding for the quote from her grandfather's diary and to Tim Ashworth of Salford Local History Library for the picture of Groves & Whitnall.