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Deadly décor: a short history of arsenic poisoning in the nineteenth century

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Abstract

At the beginning of the 19th century, wallpapers containing Scheele's green pigments were a commonplace finding in the houses of Britain. Despite apprehensions and documented cases concerning their safety dating back as far as this, it was not until later in the century when leading physicians began to support poisoning theories and a potential mechanism was found, that the general public took notice. Despite the increasing body of support for campaigns to ban the production of such papers, parliament ignored the public health scandal choosing instead to favour the huge profit arsenic mining brought by it. Regardless of the lack of legislation, wallpapers containing arsenic pigments eventually fell out of popularity as the public voted with their feet and chose to purchase "arsenic-free" papers instead.

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When most people hear the word "arsenic" used in relation to the Victorian period, the thought conjures up tales of servants poisoning the food of their cruel mistresses and murderous villains using arsenic for their crimes. However, little known to many individuals of the time and arguably far more sinister; arsenic-containing wallpapers were poisoning people from within the extravagantly adorned walls of their very own homes. Herein, I explore the story behind this obscure, accidental killer and investigate how, despite neither the wallpaper manufacturers nor the government being willing to sacrifice the huge profit arsenic brought in in-order to resolve this public health crisis, the media's influence over popular opinion helped to guide the general public to stop using such wallpapers and thus able to protect their health.

Scheele's green (copper arsenite) is an intense green pigment discovered in 1778 by Karl Scheele, a Swedish chemist. Due to it being relatively inexpensive and its vibrant green colour, during the 1800s this shade became extremely popular in the manufacture of countless home goods ranging from ball gowns to curtains and even confectionery.[1, 2] So significant was this such popularity that Victorian Britain was said to be 'bathed' in Scheele's green. In 1971, when talking about green wallpaper, the British Medical Journal described it as, "to be seen in the majority of dwellings from the palace to the navvy's hut".[1]

Suspicions regarding the safety of such arsenic wallpaper date back as far as 1839, when Leopold Gmelin, a famous German chemist, noted that damp rooms with green wallpaper often possessed a mouse-like odour, which he attributed to the production of dimethyl arsinic acid within the wallpaper.[3] He reported his concerns in *Karslruher Zeitung*, a German daily paper of the time, warning the population against applying papers containing Scheele's green pigments to the walls of their homes. It has been said that he chose to publish his article in the Sunday edition of the paper as he felt this was most likely to have impact on society. This is, therefore, an early account of using the media to raise public awareness of potential harm and thus address this public health issue.[4]

Shortly after this report came, the first major case of poisoning to hit the news headlines in the UK. It described the deaths of 4 children in London's working class Limehouse district one after the other, all suffering from sore throats and respiratory troubles. At the time of death, the children were diagnosed with diphtheria. However, the physician and surgeon in charge of the cases remained perplexed as the family home showed none of the malodourous signs thought to be causative of diphtheria, nor did the condition spread to other children in the region.

The Limehouse case was one of the first poisoning cases to hit the headlines
Image: Wellcome Library, London

It was not until Henry Letheby, a public health officer at the time, discovered that the children's bedroom had recently been papered with green wallpaper that the true cause of death was discovered. His examination of the paper found that it contained three grains per square foot of arsenic; a lethal dose.[1]

Throughout the 19th century there was circumstantial evidence from both newspapers and medical articles describing similar cases. In 1857, a Birmingham physician named William Hinds reported suffering from an overwhelming urge to vomit, abdominal cramps and light headedness each evening, which only eased upon retiring to bed. Relentlessly, symptoms would then begin again the following evening. He continued to be pained until the day the realization hit him: the onset of his symptoms overlapped exactly with the time that he retired to his green-papered study each night. He scraped off samples of his wallpapers and found that they contained arsenic. Just as promptly as he removed the green paper did his symptoms disappear, and he concluded that, "a great deal of slow poisoning is going on in Great Britain".[1]

In winter 1856, a couple reported to Hinds their curious case. The businessman and his wife were both suffering from weakness, a sore throat, inflamed eyes and headaches to such a degree that they were driven to seek refuge by the sea. Even their pet parrot was seen to be unwell, refusing to eat and drinking incessantly. Whilst at the seaside, their symptoms dissipated, but recurred almost immediately following their homecoming. Suspecting that their green wallpapers were to blame, they had them all removed and within a week the whole family, including the parrot, were back to full health.[1] The list of anecdotal case reports continued.

Here rises the public health scandal. As more and more physicians were bearing witness to such cases, a movement to ban the use of copper arsenite in the manufacture of home goods was gathering momentum. The campaign was even supported by *The Lancet* after its founder Thomas Wakley was reported to have narrowly escaped death by the green décor of the offices' walls. In its way stood an equal body of industrialists dismissing the claims as fanciful, even offering to eat pounds of their paper in order to silence opposition.[1] The driving force behind their beliefs? Revenue – such manufacturers had a great deal to lose. Green wallpaper was big business and in 1858 manufacturers estimated that there were one hundred million square miles of it in Britain alone.[1] William Morris himself was quoted as saying, "as to the arsenic scare a greater folly is hardly possible to imagine: the doctors were bitten as people bitten by witch fever".[5]

Arsenic has been found in several of Morris's early designs produced between 1864 and 1875 as well as the green dye used in his trellis pattern paper; his first commercially sold range. The motives behind his disbelief of the public's concern have in the past been questioned. Morris owned shares in his father's mining company, Devon Great Consols (DGC), which was the largest producer of arsenic at the time. It has been argued that DGC's income funded the establishment of Morris and Co. and hence his feelings towards the use of arsenic are not surprising.[6]

William Morris was scathing of the wallpaper related poisoning reports. Several of his early designs, such as the 1864 "Trellis" pattern above, contained arsenic based pigments. Images used with kind permission from The William Morris Gallery, London Borough of Waltham Forest.

Industry was not the only source of doubt. Opinion amongst scientists was divided due to several difficulties which lay in the path of confirming the dangers of such wallpapers. First of these was the non-specific nature of the symptoms of "chronic arsenism" which included headaches, fatigue, abdominal pains, vomiting, peripheral neuropathy, etc. To many members of Victorian society, these could easily be dismissed as insignificant or as the result of too many hours spent working hard, only relieved by taking a break from the room in which they studied, which coincidentally was papered green. Moreover, symptoms of the more severe condition were very similar to many of the rife conditions of the day, particularly cholera and pulmonary tuberculosis.

To make matters worse, Victorian medical management involved confining the patient to bed and thus sufferers were, metaphorically speaking, locked in with their poison until they finally expired.[1]

Secondly, not everyone in arsenic-ridden households appeared to be susceptible to its harms. From the scrutiny of case reports, it soon became apparent that many members of the population were relatively resistant to the high arsenic levels and only some individuals were of an "unfortunate constitution". This impacted considerably on the case for harm as there was not a widespread understanding of variance in vulnerability in Victorian England and consequently, since it was merely an ill-fated minority who fell peril to disastrous

decoration, the wallpaper seemed an improbable cause.[1]

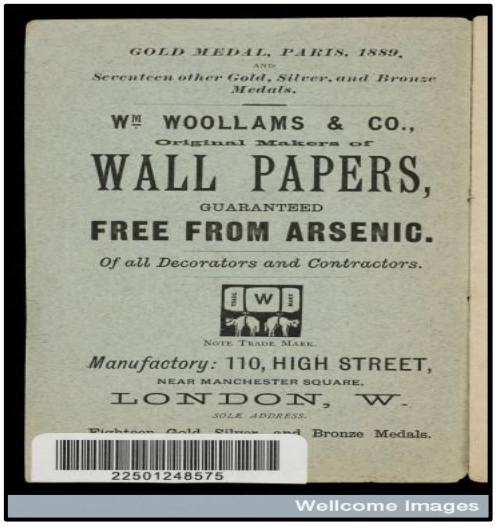
Finally, there was the lack of a proven mechanism by which this poisoning occurred. In the early 19th century the most popular hypothesis was that inhalation of arsenic particles, which brushed off wallpapers, was responsible. Whorton (2010) gives accounts of floors and shelves of rooms decorated with green papers being coated in a fine arsenic dust. One such account published in *The Lancet* described how the playroom of a 3-year-old boy found to have died of arsenic poisoning was layered with such a dust. Examinations of arsenic papers by medical men and scientists between the 1850's and 1890's revealed that all papers, not simply the cheap ones, could be seen to shed arsenic dust. However, in 1859 Alfred Hassall (one of the only medical scientists to disbelieve the poisoning theories) wrote to a scientific journal to report the findings of his own investigation of green wallpapers. He concluded that, other than at the cheap end of the market, the arsenic dyes were too tightly adhered to the papers to make this theory credible. In later years, it was suggested that the papers were producing arsenic gases, but this concept was initially rejected as the pigments were found to be non-volatile at room temperature.[1]

It was not until 1891 that the notion of arsenic gas production was re-explored by the Italian physician Barolomeo Gosio. His interest was sparked by the finding that people were still being poisoned by arsenic from papers covered by several layers of non-arsenic papers. If the cause were arsenic particles this would not be possible. Gosio's potato mash experiments went on to show that arsenic could in fact be volatilized from pigmented paper by fungi, specifically *Scopulariopsis brevicaulis*, living in wallpaper paste. He noted that the gas had a garlic-like odour, and since its composition was at the time unknown it was christened "Gosio gas". It was not until the work of Professor Frederick Challenger and his students in 1933 that the compound was identified as being trimethylarsine.[2,7,8]

One of the later individuals to become aware of this poisoning was the people's monarch herself. Although she was not personally affected, a report from 1879 describes how a visiting dignitary, who was late for presentation, had enraged Queen Victoria. Upon finally arriving in her company, the guest apologized profusely, explaining that he had fallen ill overnight and suspected that this was a direct effect of the green wallpaper lining the guest bedchamber. Horrified, the Queen ordered that all such paper be immediately stripped from the walls of Buckingham Palace, and as news of this incident leaked into the media, many of her loyal subjects followed suit.[1]

Despite the aforementioned uncertainties, by the latter half of the 19th century there was a growing mistrust of green wallpapers amongst both the medical community and the general public. Such was the pressure from society that in the early 1880's the National Health Society, an organization formed to educate the public on health-related matters, put together a committee who drew up a bill calling for a ban on the use of arsenic in household goods. The physician MP to whom they submitted it rejected their bill and Parliament considered the matter no further. It could be argued that the wealth provided by the industry was more important to the government of the day than the health of its population.[1]

This parliamentary disregard left the general public no choice but to take the matter into their own hands. Throughout the 1870s there are documented cases of families following newspaper campaigns and carrying out "home tests" such as burning strips of their wallpapers to see if a garlic odour was produced or dropping diluted hydrochloric acid onto the paper and looking for a blue colour change, both of which were said to be positive tests for arsenic. Indeed, by the final two decades of the century, public fear of wallpaper-related illness or death had created a consumer shift towards manufacturers who promised their papers were 'arsenic-free'. In some cases, this still did not render a paper safe, as some manufacturers' ongoing disdain for the arsenic poisoning theories, combined with the lack of regulatory legislation, led them to continue producing wallpapers containing high levels of arsenic while advertising them as safe. Nevertheless, over time, chemical analyses did indeed show that newer, safer pigments were slowly replacing arsenical pigments so that, by the turn of the century, the wallpaper industry had followed public concern and wallpaper poisoning had become largely a problem of the past.[1,3]



Manufacturers began to produce (or at least advertise) "arsenic free" wallpapers.
Image: Wellcome Library, London

Scarcely any systematic evidence was gathered during the 19th century and, therefore, this historical account is limited by the nature of the information available, which comprises primarily of circumstantial evidence from newspapers and the medical press. Nevertheless, this review highlights the enormous impact that the media (in Victorian times, newspapers and word of mouth; nowadays expanded by radio, television, the internet and social media) can have on public health issues. In Britain, no legislation was ever passed regarding the manufacture of arsenic wallpapers. Nevertheless, society's opinion, formed from reports in newspapers and word of mouth accounts, was sufficient for the public to vote with their feet and consequently force a shift in home goods manufacturing towards the use of safer pigments; free from arsenic.

Key Learning Points

This historical review strongly highlights the influence the media has over societal opinion, as it was the public's refusal to purchase arsenic containing wallpapers and not government legislation brought about the necessary manufacturing changes to resolve a major public health issue.

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