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Ernst Homburg and Elisabeth Vaupel (eds), *Hazardous Chemicals: Agents of Risk and Change, 1800-2000*, New York & Oxford: Berghahn, 2019, pp. xiv + 407, h/b, US\$140 / £100, ISBN 978 17892 03196

This book is of broader interest than it might appear and to support this point I shall begin this review by discussing a device presenting physical rather than chemical hazards. The hazard is that presented by lifts, cranes, winches, cable cars and other contrivances dependent on wire ropes. Wire ropes were introduced into the North East coal industry in the 1840s and considerable anxiety surrounded the use of the new ropes to wind coals, men, and boys up and down pit shafts. Then as now, the wire ropes were composed of multiple strands, each formed of multiple wires, twisted around a core to form a helical structure. Traditionally, ropes had been made of hemp. While it might seem obvious in the twenty-first century that wire ropes would be safer than hemp ropes this was by no means clear at the time. Wire ropes corroded and ropes were kept in service when there were visible breaks to wire strands; breaks might be internal and invisible so that no warning of failure could be seen. Catastrophic failures could occur if ropes were misused. On 6th June 1843, matters came to a head. Colliers at Wingate Colliery, a few miles south east of the City of Durham, observed that one of the two ropes used in the Lady Pit had suffered damage and some of the 144 strands had broken. They asked the colliery viewer, or managing engineer, Mr Armstrong, to replace both ropes; he refused. Next day a large number of the colliers struck work. It is the subsequent events that are surprising and give this episode its place in history. Armstrong summonsed a collier named Michael Barkhouse, or Backhouse, or Barkas, or Barkass (the sources disagree) before the magistrates, presumably for breaching his bond. The miners' bond was an annual agreement under which Barkhouse had agreed to work for the colliery owners for the duration of the year and they, for their part, had agreed to find work for him. The magistrate sought to bring

the parties to an agreement but failed, and released Barkhouse from his bond. Barkhouse then summonsed the colliery owners for debt, namely the wages he had lost over the several weeks before he (and the owners) were released from the bond. The case was heard before the civil side at the Durham Summer Assizes before Mr Justice Cresswell.

From the start it was apparent that neither plaintiff nor defendant was particularly concerned about the lost wages. The action for debt was simply a device to enable the court to test whether the colliers had been justified in refusing to go down the pit under wire ropes. In reaching a decision on this matter the Justice accepted that the key point was whether wire ropes, and in particular wire ropes in which a number of strands had broken, were in fact safe. To assess this plaintiffs and defendants called expert witnesses: colliery viewers and engineers who had experience in the use of wire ropes, either as used in hauling waggons up inclined planes or in winding men and materials up and down vertical pit shafts. Some of these witnesses had conducted tests of wire ropes with breaks to various numbers of strands, distributed along the rope or concentrated at a single location, and subject to various weights. What was ostensibly an action for the recovery of debt became a technical debate on the qualities of wire ropes in comparison with the traditional hempen. The case was held before a Special Jury made up of eight 'gentlemen', including Frederick Backhouse of Stockton and J.C. Backhouse of Darlington, both of the Quaker banking family, made up to twelve with four men called from the common jury list. The jury found for the defendants. But there was, reported the local newspapers, '[n]o manifestation of feeling' at this result, possibly because the evidence was fairly conclusive that, except in the presence of salt water or heat, wire ropes were safe even when some strands were broken; the twisting of the wires and the strands generating sufficient friction to render scattered breaks of single wires immaterial (*Durham Chronicle*, Barkhouse v. Cargill and others, 2 August 1844; *Miners' Advocate*, 10 February, 23 March, 24 August 1844; *Newcastle*

Courant, Barkas v. Cargill and Others, 2 August 1844; *Northern Star and Leeds General Advertiser*, Backhouse v. Cargill and Others, 3 August 1844).

The Wingate Wire Ropes Case is remarkable and deserves to be better known. In some respects its procedure appears superior to that followed by the present-day Grenfell Tower Inquiry subject as the latter has been to tight ministerial control and competent to make recommendations but unable to ensure that they are carried out. The Wingate Case was initiated by working miners who needed no permission from a Minister or a Secretary of State to bring their case. That the case was heard before an Assize Court gave its proceedings authority and enabled, had the decision gone the other way, a wide variety of remedies to have been imposed. Yet within a few years the 1850 Coal Mines Inspection Act had introduced the regulation, inspection, and investigation regime which controlled health and safety in the British coal mining industry till its closure in 2015. This was the pattern followed by the Alkali Act of 1863 which, with its extensions, became the main method of controlling the pollution and safety of the heavy chemicals industries in the UK until the 1975 Health and Safety at Work Act and the 1990 Environmental Protection Act.

The conventional histories of workplace, domestic, and environmental hazards in the UK rarely discuss why this regime has arisen. Conventional accounts do indeed unite in their focus on legislation and the introduction of regimes of regulation, inspection and state-controlled investigation. They vary in the degree to which they foreground heroic individuals (Joseph Hannay, Humphrey Davy, William Wilberforce, Samuel Plimsoll, Louis Pasteur, Annie Besant, Olivia Hill) or, alternatively, an amorphous 'public opinion', that is an educated, or middle class opinion (Oliver MacDonagh, 'The nineteenth century revolution in government: A reappraisal', *Historical Journal*, 1 (1958), 52-67; Jenifer Hart, 'Nineteenth-century social reform: A Tory interpretation of History', *Past and Present*, 31 (1965), 39-61) but treats the 'evolution' of legislation and regulation as natural and inevitable and fails to

ask why these mechanisms and not others came to arise. The Wingate case suggests the viability of an alternative process driven by working-class activism based on the common law and jury decisions, at least for workplace hazards, and in general, the possibility of democratic participation in place of elite control.

The collection of studies under review is of much help in considering such questions because of its temporal and international scope despite its self-imposed limitation to chemical hazards. The definition of 'chemicals' used by the editors and their contributors is the narrow one of substances having a constant composition and invariant properties rather than the broader one of any substance viewed chemically, that is, matter in all its forms. Under the former definition mercury is a chemical but coal is not; coal is merely a group of solid mixtures of matter consisting of carbon, ash, and various volatile substances in variable proportions. Hence the book contains contributions on copper arsenite pigments (in the period 1800-1890), on lead and lead carbonate ('white lead') (1800-1980), aromatic amines (1880-1980), cyclamates (1930s-1980s), and cadmium (1910-2010), on dioxins (1900-1990s), organophosphates (1930s-2000), and DDT (1945-2000), on phenoxy herbicides (1940s-2000), and the petrol additive MTBE (1980s-2000), but nothing on the pollutants released by the combustion of wood and fossil fuels, nothing on smog or sewage, nothing on the disposal of non-biodegradable plastics, nothing on hazardous diets, or 'noxious behaviours', such as smoking tobacco and imbibing alcoholic drinks.

Nevertheless there is much of value here. The contributions cover the twentieth century more fully than the nineteenth century and are focussed on the nations with the leading chemical industries: the USA, Germany, the UK, France, and Japan. Unavoidably, in the chapters on dioxins and phenoxy herbicides, the contributors consider Vietnam, in its role as the victim of the 'Agent Orange' chemical warfare attacks by the United States. The editors recognize the omission of the rest of the Global South; China and Russia are also

absent. However, the collection still represents a major advance over the great majority of contributions to this field which cover only a single country, often only a single industry in a single country. The value is particularly apparent in two contributions, on a lead-based pigment known as Schweinfurt Green by Joost Mertens, and on cadmium pollution in Japan, which gave rise to a disease now known as *itai-itai* disease, by Masanori Kaji. Both these contributions raise questions about the emergence of different national practices of response to hazards and their control which may contribute to an understanding of why, in the UK, processes like the Wingate Case became moribund and processes like the Grenfell Tower Inquiry now dominate.

Schweinfurt Green was first synthesized by Ignaz von Mitis in Vienna in 1808 and Wilhelm Sattler in Schweinfurt in 1814; the name *Schweinfurter Grün* became better known than *Mitis Grün*. It was based on white arsenic (arsenic trioxide) and was used as a pigment in paints, wallpaper and confectionery. It has sometimes been suggested that Napoleon I died due to arsenic poisoning arising from the gradual liberation of arsenic from pigments colouring the papers on the walls of his lodgings on St Helena (David Jones, 'The singular case of Napoleon's wallpaper', *New Scientist*, 14 October 1982, 101-4), though the hypothesis is nowadays discounted and Mertens is too fastidious to mention it. It is unclear how many died by poisoning by Schweinfurt Green; the diagnosis of chronic arsenic poisoning was difficult and tracing the source of the arsenic in nineteenth century conditions where arsenical compounds were widely used all but impossible. Remarkably, this did not stop attempts to regulate the production and consumption of the pigment in France and Germany. In early nineteenth-century Paris, Ancien Régime regulation survived in the form of a list of prohibited and a list of permitted colourants for the preparation of specified sweetmeats and foodstuffs. From 1800 the authority to enforce the regulation of food safety in Paris was vested in the Prefect of Police who also presided over a *Conseil de*

Salubrité. In 1830 Schweinfurt Green was included in a new list of prohibited food colourants by the Paris Prefect. All this was without a single confirmed death.

In Germany, concern was first voiced over the use of Schweinfurt Green in wallpaper, not food. The leading German state in this field was the Grand Duchy of Baden which by the 1840s had a staff of medical officers, a health commission and a sanitary police. Baden decided that banning the pigment and banning wallpaper printed with it was not practical and would only lead to administrative burdens and popular evasion; instead it focussed on promulgating information, searching for technical solutions, and recommending precautions. In this it was guided by a concern for 'industrial liberty', doubting whether the banning of a poisonous substance was justifiable if citizens were aware of its dangers. Prussia disagreed. In 1848 Schweinfurt Green was banned in paper and wallpapers and in 1856 the production of Schweinfurt Green was banned throughout Prussia and the Zollverein states. Not only this, citizens who had already covered their walls with the banned papers were required to remove them; if they did not the police would --a legal possibility which leads one to imagine bizarre scenes of Prussian police officers wielding wallpaper strippers at the top of decorators' ladders. Paris decided not to follow this drastic step. In Paris, argues Mertens, there was, as in the earlier Baden, a greater respect for 'industrial liberty' than in Prussia and the result was a series of regulations of restricted scope banning use, not production, and of specific applications of the pigment, not the pigment as such.

If Mertens's contribution therefore raises questions about the influence of political cultures, Masanori Kaji's contribution in contrast raises questions about legal cultures. *Itai-itai* means 'it hurts, it hurts' and the main symptom of the disease is severe pain throughout the body, often to the point where sufferers will cry out. It was first noticed about 1935 but not fully described and named (by a local newspaper) until the mid-1950s. At first,

investigators ignored the epidemiological evidence, and suggested it was a rheumatoid disease, or a disease due to overwork, or malnutrition but the concentration of cases in a rice growing area irrigated by water from a river, the River Jinzū, into upstream areas of which waste from a zinc ore mine was tipped was conclusive. The mine was owned by the Mitsui Group once one of Japan's *zaibatsu*, now usually termed a *keiretsu*. The cause was found to be cadmium poisoning, cadmium sulphide often being found with the main zinc-bearing mineral sphalerite or zinc sulphide. Farmers and fishers organized an association to fight against the pollution of the river water in 1932 and in 1948 two associations with the same name, the Jinzū Mining Pollution Prevention Council, were formed. One was an association of local authorities, the other was an association of farming co-operatives. They later merged. They succeeded in obtaining compensation from the mine on an annual basis from 1949, though none of this covered the pain and suffering of *itai-itai* disease which had still not been linked conclusively to the river pollution caused by the mine. This did not happen until 1961 and required, according to Kaji, the development of novel techniques for the chemical analysis of cadmium and other heavy metal pollutants. In 1968 fourteen surviving victims and fourteen relatives of deceased victims filed a lawsuit against Mitsui demanding 61 million yen for pain and suffering (about US\$170,000 at the then current official exchange rate, perhaps US\$1.25 million in today's values). Surprisingly, at least to this British historian, inured to seeing one law case after another brought by weak victims against powerful corporations fail in the British courts, and especially given the scale of Mitsui and the closeness of Japanese industry to the ruling Liberal-Democratic regime, the victims won. The case became one of the 'four major pollution-related lawsuits', as they are known in Japan, all of which were won by the victims. The other three were suits over the mercury poisoning that caused *Minamata* disease, the closely related *Niigata Minamata* disease, and a suit over *Yokkaichi* asthma. The settlement of the *itai-itai* case involved not

only financial compensation but also an agreement to a continuing oversight by the victims' association of Mitsui's operation of the mine. This required an enduring collaboration between scientific experts and citizens. Cadmium levels in the Jinzū River are now at normal levels.

Quite how this unusually successful and cheering outcome has been achieved Kaji does not really explain. His account emphasizes the medical and scientific endeavour of a small number of individuals and thus tends toward the heroic. Nevertheless, the documentation of a legal system which seems capable of producing outcomes in favour of the weak and against the powerful is an exceptionally useful service and raises potentially important questions for future research. Despite its limitations this collection is an important addition to the literature and will help the field take the now overdue step from national to global research.

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