

Uses and Misuses of Chemicals in the British Home, 1930s – 1980s.

Catherine L. Rushmore

Submitted to Oxford Brookes University
in partial fulfilment of the requirements of the award
of
Doctor of Philosophy

September 2016

Word count: 93 848

Contents

Table of Contents	1
Abstract	3
Acknowledgements	4
Figures and Tables	5
Abbreviations	7
Chapter 1: Introduction	8
Why study the home and activities within it?	12
Studying ordinariness through risk	19
Accidents in the home	21
Children in the home are especially at risk	23
Poisoning	24
Intentional	26
Murder	29
Anticipating and Controlling Risks	29
The first chemical to be regulated in Britain: arsenic	34
Disinfection and dilemma: carbolic acid	35
Access to chemicals: retail	36
Chapter 2: Sources and Methods	42
Objects and Museum Collections	42
Manuals	51
Newspaper and Magazines	53
Advertisements	55
Glimpses of real users	58
Users in their own words	59
Chapter 3: Housework	64
Advice on stain removal	67
Advice on first aid	69
Sodas	71
Washing soda and Carbosil	74
Carbon tetrachloride	88
Hair care	90
Household cleaning, stain removal and Thawpit	92
Conclusions	102
Chapter 4: Gardening	106
Advice on pests and weeds	106
Sodium chlorate	115
Misuse: Bombs and Bangers	121
Misuse: Poisoning	128
<i>Continued overleaf</i>	

Paraquat	129
Misuse: Poisoning	133
Preventing misuse	145
Conclusions	149
Chapter 5: Home processing	152
Advice about photography chemicals	155
Chemicals and the skin	181
Metol and Phenidone	183
Flash chemistry	187
Carbon tetrachloride	193
Conclusions	196
Chapter 6: Users and Misusers	199
Ignorant users	200
Careless users	201
Inquisitive children	205
Despairing users	213
Ideal users	218
Gendered users	219
Indifferent users	224
Non-users	225
Chapter 7: Conclusions	232
Risk, safety and responsibility	235
Chemicals should be social history	240
Chemicals and lifestyle	242
Moving forward	244
Bibliography	245
Archives	245
The Walgreens Boots Alliance Archive, Nottingham	245
History of Advertising Trust, Raveningham	245
The National Archives, Kew	245
The Keep, Brighton	247
Other Collections	248
Personal testimonies, personal communication	248
Websites, electronic resources and reports	250
Periodicals	251
Manuals, leaflets, broadcasts	262
Secondary sources	264
Image Acknowledgements	277

Abstract

Between the 1930s and 1980s, British home life was transformed by the adoption of labour-saving technologies, among which were chemicals. The voluntary, domestic use of man-made, branded and unbranded chemicals and products (excluding drugs or medicines) is a topic that has been neglected, making this thesis original. From my experience as a museum professional, I was aware that domestically used chemicals were collected but were rarely foregrounded or fully interpreted.

This thesis has been constructed by piecing together details from objects, adverts, periodicals and specialist advice literature, as well as industry reports, oral histories and written testimonies. Three different user groups, each with their own distinct aims for using chemicals in the home are considered – housewives, gardeners and photographers – in addition to a group of unintended users, children. This selection of activities not only incorporated housework and leisure, but it also facilitated the study and comparison of women, men and children, which contributed to an inclusive view of domestic life and what it meant to be a domestic user of chemicals.

Users and misusers are central to understanding why chemical products exist in particular forms. The types of problems – accidental ingestion, deliberate poisoning, explosions and allergic reactions – were consistent over the period studied. For the bodies responsible for the development, sale and use of chemicals, the tension between providing information so that users could behave safely, and withholding it so that they would either not be deterred from using chemicals or be tempted subvert any warnings, remained a continual preoccupation. The users and misusers in this narrative are given agency: they managed risks themselves, and sometimes they circumvented the safeguards that had been demanded on their behalf. This thesis argues that the domestic uses and misuses of ordinary chemicals shaped the chemicals that were ultimately available to use in British homes.

Acknowledgements and Thanks

The AHRC's financial support allowed me to leave my job as a curator and pursue this opportunity. All my supervisors: Viviane Quirke, Glen O'Hara and Peter Morris, have been the right mixture of encouraging, patient and questioning throughout the process and I have learned a lot from them. Carol Beadle, as my proof-reader, has helped me to write more clearly, and deserves a medal. Any grammatical errors that remain are mine alone. Thanks to my examiners Katherine Watson and Regina Blasczyk whose questions, attention to detail and encouragement have been helpful. Tom Crook kindly provided a preprint version of his book. Without the assistance of numerous archivists and curators who facilitated access to the primary sources, this thesis would not exist, and I am very appreciative of their efforts. I am grateful to my interviewees, for participating and permitting me to quote them. Thanks also to all the people who asked questions when I delivered conference papers, and who listened to me practice my ideas. Special thanks to my family for sustaining me and supporting me through this journey.

Figures and Tables

Figure 1.1: Graph showing the yearly admissions of poisoned patients in Edinburgh between 1928 and 1963, indicating decreased incidence of non-drug poisoning as all other methods increased	26
Table 1.1: Timeline of control measures relating to chemicals in Britain.....	31
Figure 2.1 Pesticides displayed in Making the Modern World under the heading “Chemicals in food”. Paraquat is in one of the two small jars in the front row, left. (author’s photo, 02 September 2013)	46
Figure 2.2 Shelf of chemicals at the Garden Museum, Abol weedkiller on the left. (author’s photo, 13 August 2013)	48
Figure 2.3 One of two darkrooms at the Hardmans’ House. Chemicals are all around the room, here they surround the sink and fill the wall cabinet. (author’s photo, 31 July 2014)	49
Figure 3.1: A large jar of washing soda on the window sill in a home economics classroom, circa 1960. (BF 1/1/19a 66/1877, © London Metropolitan Archives)	67
Table 3.1: Domestic uses and misuses of sodas.....	75-76
Figure 3.2 This advert gave the user reasons for choosing Carbosil, and made it clear that Carbosil was not just common soda © British Library Board (<i>The Sunderland Echo and Shipping Gazette</i> , 23 March 1932)	80
Figure 3.3: Carbosil saves Soap © British Library Board (<i>The Sunderland Echo and Shipping Gazette</i> , 23 March 1932)	81
Figure 3.4: ICI’s response to paper control order ©The Times Digital Archive 17 October 1940	82
Figure 3.5: JWT’s functional and emotional appeals, © British Library Board, <i>The Northern Daily Mail</i> , 25 July 1945 (top) and <i>The Northern Daily Mail</i> , 16 June 1946, (bottom)	95
Figure 3.6: Taken from an internal Boots magazine (1954), this image shows Thawpitt’s new packaging with the cleaning pad attached to the bottle, although the recognisable hexagonal shape was retained © The Walgreens Boots Alliance Archive.....	96
Figure 4.1: A reader of Practical Gardening remedied the illegibly small instructions on chemical packaging (December 1966)	114
Figure 4.2: A Practical Gardener reader’s suggestion to keep appropriate dosing equipment and instructions available (April 1964)	114
Figure 4.3: A worker sprays herbicide at the tracks from a Chipman Chemical Co Ltd carriage in 1955. © National Railway Museum / Science & Society Picture Library	115
Figure 4.4: Cooke’s sodium chlorate advert, PG magazine, 1981	119
Figure 4.5: Bird’s sodium chlorate advert, PG magazine, 1966	119
Figure 4.6: The icon for “flammable” (introduced 1967)	121

Figure 4.7: The icon for “oxidising” (introduced 1967)	121
Figure 4.8: Announcement sent to all Boots branches (1970) © The Walgreens Boots Alliance Archive.....	126
Table 4.1: Timeline of relevant company activities and key events in paraquat’s development.....	130-131
Table 4.2: Key words used in Weedol advertisements, 1965-1984.....	140
Figure 4.9: Weedol advert, <i>The Daily Mail</i> 08 April 1971, © Daily Mail Historical Archive	141
Table 4.3: Table summarising sodium chlorate and paraquat.....	150
Table 5.1: Branded developers advertised in AP emphasised functional names and usability but rarely showed images of users.....	169-170
Figure 5.1: Although staple food items were rationed, Johnson assured users they could continue their hobby unhindered (AP, 06 December 1944, front page).....	174
Figure 5.2: A scientist confirms the purity of Kodak chemicals (AP 30 April 1941 front page).....	174
Figure 5.3: Burroughs Wellcome & Company Tabloid fine-grain developer showed off their results rather than the tablet formation (top), and Johnsons aimed to please a variety of users with developers in three different forms: liquid, powder, tablets (below). (AP 24 September 1944, p2).....	177
Figure 5.4: Reused medicine bottle (author’s photo, 26 August 2014, MSI).....	179
Figure 5.5: This photograph from AP 1938 shows bulldog clips being used as makeshift handles which also keep the film flat to pass it evenly through the solution and to hang it as it dried. Typically, gloves are not shown.....	181
Figure 5.6: An inch of magnesium ribbon protrudes from the holder next to a lit candle (© <i>British Library Board</i> Kodak Magazine, 1930).....	188
Figure 5.7: Vial of Johnsons flash powder, showing the instruction to “shake thoroughly” to mix. 1920s-30s. (object number 1990-5036/3609/2/1, © NMEM, Science Museum / Science & Society Picture Library).....	189
Figure 5.8: A box of flash bulbs (1935) which clearly lay out the disadvantages of flash powder. (object number 1979-0486 © Science Museum / Science & Society Picture Library).....	190
Figure 6.1: This illustration from a Boots Lornox brochure did not mean that children were intended to use the herbicide, only that the product was simple enough to be used by a child (1948) © The Walgreens Boots Alliance Archive	207
Table 6.1 Table of products abused by substance 1971-1996, adapted from Taylor et al, 1998. Some substances were co-abused, deaths are as percentage of substances, not percentage of deaths.....	210

Abbreviations

Publications

AG	<i>Amateur Gardening</i>
AP	<i>Amateur Photographer</i>
APC	<i>Amateur Photographer and Cinematographer</i>
BMJ	<i>British Medical Journal</i>
DM	<i>Daily Mail</i>
GH	<i>Good Housekeeping Magazine</i>
MG	<i>Manchester Guardian</i>
PG	<i>Practical Gardening</i>
TG	<i>Guardian</i>
TT	<i>The Times</i>

Organisations, Committees, Groups and Companies

GHI	Good Housekeeping Institute
ICI	Imperial Chemical Industries
MAFF	Ministry of Agriculture, Fisheries and Food
NAS	National Allotment Society
PAC	Pesticides Advisory Committee
PSPS	Pesticides Safety Precautionary Scheme
RHS	Royal Horticultural Society
RoSPA	Royal Society for the Prevention of Accidents
UAC	United Alkali Company

Chemicals

CT	carbon tetrachloride
DDT	dichloro-diphenyl-trichloroethane

Archives and Museums

HAT	History of Advertising Trust
IEA	Institute of Education Archives
MSI	Museum of Science and Industry
NMeM	National Media Museum
TNA	The National Archives

Chapter 1: Introduction

The home has been a major site of revolutions in technologies which can broadly be described as labour-saving.¹ Histories of everyday, domestic technologies and their users are rich and engaging topics for research.² For instance, gas, electricity and water, as well as the machines and practices that these utilities permitted, have been examined in depth.³ However, the chemicals, that is to say the man-made compounds and related branded products, used in conjunction with domestic appliances and leisure equipment, are strangely absent from these narratives.⁴ What struck the author, as an ex-curator and avid museum visitor, was that museum collections and displays mirrored this absence. Museums do not just display the past: they have been afforded the power to create the past. Therefore, through exclusion, museums contribute to collective amnesia instead of inspiring their visitors to remember, reflect or research.⁵

To begin to address such an oversight, this thesis examines some of the chemicals used in British homes between the 1930s and the 1980s. I chose to limit the vast range of chemicals to a small selection used in three different domestic activities. By studying cleaning, weeding and developing photographs, the scope of

¹ Ruth Schwartz Cowan, "The 'Industrial Revolution' in the Home: Household Technology and Social Change in the 20th Century," *Technology and Culture* 17 (1976): 1-23; Alison Ravetz and Richard Turkington, *The Place of Home: English Domestic Environments, 1914 - 2000* (London: E & FN Spon, 1995).

² Nelly Oudshoorn and Trevor Pinch (eds), *How Users Matter: The Co-Construction of Users and Technology* (London: MIT Press, 2005).

³ Anne Clendinning, *Demons of Domesticity: Women and the English Gas Industry, 1889-1939* (Aldershot: Ashgate, 2004); Graeme Gooday, *Domesticating Electricity: Technology, Uncertainty and Gender 1880-1914* (London: Pickering and Chatto, 2008); Glen O'Hara, *The Politics of Water in Post-War Britain* (Basingstoke: Palgrave Macmillan, 2016); Joy Parr, "What Makes Washday Less Blue? Gender, Nation and Technology Choice in Postwar Canada," *Technology and Culture* 38 (1997): 153-186.

⁴ Mark Bhatti and Andrew Church, "'I Never Promised You a Rose Garden': Gender, Leisure and Home-Making," *Leisure Studies* 19 (2000): 188; Robert Stebbins, *Leisure and Consumption: Common Ground/Separate Worlds* (Basingstoke: Palgrave Macmillan, 2009); Brad Beavan, *Leisure, Citizenship and Working-Class Men in Britain 1850-1945* (Manchester: Manchester University Press, 2005), 139-140; Steven Gelber, *Hobbies: Leisure and the Culture of Work in America* (New York: Columbia University Press, 1999).

⁵ Graham Black, "Museums, Memory and History," *Cultural & Social History* 8 (2011): 417-421; Brian Ott et al., "Ways of (Not) Seeing Guns: Presence and Absence at the Cody Firearms Museum," *Communication and Critical/Cultural Studies* 8 (2011): 215-239.

domestic technologies is broadened beyond the utility networks and household machines that alleviated the drudgery of housework. As with durable technologies, the appeal of labour-saving chemical technologies has been enhanced by the fact that women increasingly sought employment outside their homes, leaving them with less time for housework.⁶ However, leisure pursuits also incorporated labour-saving practices, such as conveniently prepared and packaged chemicals, so by studying gardening and photography, the domestic activities of men and children as well as women can be considered.

These chemicals were presented to domestic users as labour-saving options, sometimes as safer alternatives to older and more dangerous chemicals. The risks of chemical misuse were poisoning, chemical burns and explosions, all of which occurred in the home as a result of accidents, or deliberately. Such risks and how they were managed by users themselves at home will be explored in this thesis, because practices shape public life.⁷ My argument is that past misuses of chemicals have shaped people's subsequent access to, and perceptions of, chemicals.

Risk management has also taken place on multiple levels before a chemical gets into a home: the retailer scrutinises the buyer and can either complete or terminate the transaction, while manufacturers develop branded products and their packaging with risk reduction in mind. Retailers, manufacturers and individuals have to some degree managed those risks independently, but in a type of feedback cycle government has also been important in validating and strengthening those constraints. For instance, the period of study is bounded by the introduction of the Pharmacy and Poisons Act (1933), and the Consumer Protection Act (1987). Why did these Acts exist? Why should the government be interested in protecting chemical users? Britain is not unique in the fact that regulating risks has become a "central and obsessive dimension of governing".⁸ Arwen Mohun *et al.* have answered these

⁶ Ina Zweiniger-Bargielowska, *Austerity in Britain: Rationing, Controls, and Consumption, 1939-1955* (Oxford: Oxford University Press, 2000), 157-158, 160-161.

⁷ Frank Trentmann, "Citizenship and Consumption," *Journal of Consumer Culture* 7 (2007): 155.

⁸ Tom Crook and Mike Esbester, "Risk and the History of Governing Modern Britain, c.1800-2000," Chapter 1 in *Governing Risks in Modern Britain: Danger, Safety and Accidents, c.1800-2000* ed. Tom Crook and Mike Esbester (London: Palgrave Macmillan, 2016), 3.

questions by stating that “the most important function of the modern liberal state is to secure both liberty and safety, and therefore to manage risk on behalf of its citizens”.⁹

The Poisons and Pharmacy Act, as well as the Consumer Protection Act, embody the emphasis on protecting users as Britain became increasingly consumer-oriented between the 1930s and the 1980s. Consumers were considered to be important by politicians, economists, strategists and marketers.¹⁰ Women in particular were praised, because they managed households and made purchasing decisions under varying conditions and constraints, such as income, wartime rationing, and the dynamic needs of families. The power of consumers was not found only in their ability to spend or to withhold their money, but also to question practices and demand change.

Research about consumers has concentrated on durable household technologies coded as markers of wealth and status, but throughout this thesis I have preferred the word “user” to “consumer”. This thesis focuses on goods that were bought relatively cheaply and without much ceremony, then used up, so “user” emphasises the utility of chemicals. Additionally, the terminology of users and misusers helps to avoid confusion with the ingestion of chemicals, their literal consumption, a common misuse that recurs throughout the thesis. The uses and misuses of chemicals in the domestic environment are the central concerns of the thesis, which is structured to describe three areas of activity (housework, weed control and photography) chosen because they were expected to be carried out by three user groups, women, men and children. In practice, these boundaries were porous, especially when examples of misuse were included. Studying the domestic uses of chemicals enables me to consider how risks were communicated and how responsibility for managing risks was addressed in this environment. Not all of the chemicals or products selected for study were harmful, but understanding how to

⁹ Arwen Mohun et al., “Conclusion: Governing Risks in Britain and Beyond,” Chapter 13 in *Governing Risks in Modern Britain* ed. Crook and Esbester, 301.

¹⁰ Zweiniger-Bargielowska, *Austerity in Britain*, 99.

safely, thriftily and appropriately use chemicals at home were important factors in managing domestic risks.

The selection of activities includes occasions where chemical use was not obligatory but a choice made because it made the work easier or more pleasant. For instance, weeds could be pulled by hand and cleaning could make use of many different non-chemical methods. Whereas developing photographs or illuminating a dark scene relied on the careful and correct use chemicals. Additionally, all three activities are represented (to some extent) in museums so the visibility of chemicals and their users through display and interpretation will be the subject of Chapter 2.

To further explain the boundaries of this research, the period between the 1930s and the 1980s has been described as the new “Chemical Age” because of the chemical industry’s rapid development at this time.¹¹ Coupled to the growth of the chemical industry’s ability to mass produce synthetic chemicals was the availability of new products for the domestic market. This thesis is unconcerned with perceptions of synthetic versus “natural” chemicals. Instead, it focuses on awareness of and access to a growing variety of mass-produced chemicals and related products.

Therefore, Chapter 3 concentrates on cleaning agents: washing soda (sodium carbonate) and carbon tetrachloride (CT). To provide branded counterpoints, I include Carbosil, a soda-type product and Thawpit grease solvent based on CT. Two weedkillers, sodium chlorate and paraquat are the focus of Chapter 4. Paraquat was only available in two branded products, Grammoxone and Weedol, which were developed for professional agriculturalists and amateur gardeners respectively. Tension arose from the existence of separate products for the two user groups and this situation was not seen in the other case studies. Chapter 5 profiles two chemicals used in photographic developers, metol and phenidone, then revisits carbon tetrachloride because photographers also used this chemical. Chemical flash provides the opportunity to examine an inherently risky but entirely voluntary use of chemicals, one without counterpart in cleaning or gardening. However, sodium

¹¹ Hugh Crone, *Chemicals & Society: A Guide to the New Chemical Age* (Cambridge: Cambridge University Press, 1986), 7-8.

chlorate's oxidising properties meant that it could become involved in accidental fires or deliberately used to make explosives, so the uses, warnings and instructions associated with flash chemistry are considered in relation to those given to gardeners and sodium chlorate. Two further chapters complete the analysis: in Chapter 6 the users and misusers of the different user groups are compared, and the thesis is concluded in Chapter 7.

Why study the home and activities within it?

Between the 1930s and the 1980s, the home was where young children and women spent much of their time, and as living standards rose during this period, men and youths increasingly gravitated towards spending leisure time at home.¹² For all the ubiquity and diversity of home life, in the 1970s Ruth Schwartz Cowan expressed disappointment at the fact that diarists, commentators and therefore historians have simply not found homely topics to be worthy of comment, nor appreciated their significance.¹³ Despite calls from Cowan and Susan Strasser for historians to become more attuned to mundane domestic topics, details of housework, home management and even hobbies are still considered so trivial that few academics study them.¹⁴ This thesis addresses a blind spot in discussions about everyday activities in the home and garden. My research highlights the use of chemicals and products, rather than investigates class differences, or the gendered division of household labour and leisure preferences, as other historians have done.¹⁵ The abundance or scarcity of time, money and domestic space were involved in determining whether and how weeding, cleaning and developing photographs were undertaken, yet although questions of class run through the

¹² Brad Beavan, *Leisure, Citizenship and Working-Class Men in Britain 1850-1945* (Manchester: Manchester University Press, 2005), 139-140.

¹³ Cowan, "The 'Industrial Revolution' in the Home", 1-2, 14. Susan Strasser, *Never Done: A History of American Housework* (New York: Pantheon Books, 1982).

¹⁴ Elizabeth Davidoff cited in Zweiniger-Bargielowska, *Austerity in Britain*, 101; Lydia Martens and Sue Scott, "'The Unbearable Lightness of Cleaning': Representations of Domestic Practice and Products in Good Housekeeping Magazine (UK): 1951-2001," *Consumption, Markets and Culture* 8 (2005): 380.

¹⁵ Ann Oakley, *Housewife* (London: A. Lane, 1974); Lucy Delap, "Housework, Housewives and Domestic Workers: Twentieth-Century Dilemmas of Domesticity," *Home Cultures* 8, (2011): 189-210.

research, I was more interested in studying user behaviours and the chemicals themselves.

The gaps in the literature concerning chemicals and their uses seem to exist because of an unwillingness of historians to engage with chemical use and their reluctance to face the misuses of ordinarily unthreatening chemicals, both of which reflect the indifference that the users themselves had towards thinking about chemicals. Abundant evidence is available to examine domestic users, and their uses and misuses of chemicals, so shortage of evidence does not explain the previous lack of attention to chemicals in the home. One of the reasons for this absence is that studies of consumption have often been limited to luxury goods, instead of ordinary, routine consumption.¹⁶

This thesis draws heavily on magazines and books that informed and instructed housewives, amateur gardeners and photographers, because these resources survived to be interrogated by historians. The rich content of advice literature and popular magazines has formed the basis of many studies of domestic life, because personal diaries rarely contain reflection on these mundane topics. Readers' letters provide insights into the lived experiences of such publications' audiences, but they must be used cautiously, with the view that they have been edited or even fabricated.¹⁷

Advice literature and magazines provided Charlotte Nicklas with evidence about the domestic use of chemicals, particularly dyes, in British and American homes in the mid to late nineteenth century.¹⁸ Her research revealed that chemicals were used at home under ordinary domestic circumstances, such as cleaning with acids, and that keeping chemicals at home meant that they were available to be either accidentally or deliberately misused in poisonings.¹⁹ Nicklas highlighted how keeping abreast of chemistry and chemical advances was an important part of being

¹⁶ Jukka Gronow and Alan Warde (eds), *Ordinary Consumption* (London; New York: Routledge, 2001), 4-5.

¹⁷ Adrian Bingham, *Family Newspapers? Sex, Private Life and the British Popular Press 1918-78* (Oxford: Oxford University Press, 2009), 9.

¹⁸ Charlotte Nicklas, "Splendid Hues: Colour, Dyes, Everyday Science and Women's Fashion 1840 – 1875," (Ph.D., University of Brighton, 2009).

¹⁹ *Ibid*, 13, 166, 178-180, 185.

a rational middle-class consumer, and the responses from readers indicated an appetite for quite technical content. This thesis picks up strands of Nicklas' story by using similar methodologies, specifically domestic advice literature available in Britain and readers' responses, and to a limited extent, content, in that it looks at the use of domestic chemicals in a later, more commoditised era.

Many of the hallmarks of domestic modernisation can be viewed as intrinsically linked to newly synthesised and increasingly affordable mass produced chemicals. Modern materials used throughout the home allowed cleanliness to be redefined and detached from laborious behaviours such as boiling and scrubbing.²⁰ Instead, cleanliness became associated with fresh smells and glistening, spotless surfaces delivered by chemical products, not toil.²¹ The names of branded domestic chemicals even used the language of ease²² which hinted at saved time and effort, whether they were marketed to housewives, gardeners or photographers.

Advertising and packaging tells a partial story, based on messages broadcast on behalf of branded products. Only the expected or imagined users and uses are evident, and unbranded chemicals are rendered by invisible this approach. However, evidence about users takes many more forms and it is worth uncovering. Historians of domestic technology have carved out space for users, both as individuals and as types or groups, which provides opportunities to examine in greater detail the vague "markets" referred to by business historians. By adopting the definition of technology as "any means or activity by which man seeks to change or manipulate his environment",²³ chemicals used in the home and garden can legitimately be investigated as technologies, and chemical users as technology users. Treating chemicals as domestic technologies is one way to highlight their

²⁰ Tom Fisher, "A World of Colour and Bright Shining Surfaces: Experiences of Plastics after the Second World War," *Journal of Design History* 26 (2013): 285-303.

²¹ Sean Nixon, "Mrs Housewife and the Ad Men: Advertising, Market Research and Mass Consumption in Postwar Britain", in *The Rise of Marketing and Market Research*, ed. H. Berghoff et al. (New York: Palgrave Macmillan, 2012), 203.

²² Martens and Scott, "The Unbearable Lightness of Cleaning," 386, 388, 392; Jessamyn Neuhaus, *Housework and Housewives in Modern American Advertising: Married to the Mop* (New York: Palgrave Macmillan, 2011), 22, 26, 74-75, 90-91.

²³ Ruth Oldenziel, *Making Technology Masculine: Men, Women and Modern Machines in America, 1870-1945* (Amsterdam: Amsterdam University Press, 1999), 15.

importance, and doing so also uncovers the multiple stories that exist beyond discovery or invention. Use-based histories of technologies tells us about the changing uses and users over time, they show that there are alternatives and that it is not inevitable that users adopt technologies at all, nor employ them or their associated customer support services, such as warranties or advice services, in a certain way.²⁴ Histories of use and misuse illuminate technologies' meanings and uses constructed by users, misusers and non-users, which are not always the same as those that the manufacturers and marketers foresee or want.²⁵

Use-based histories can also tell us about satisfaction and dissatisfaction. Had Regina Blaszczyk relied only upon advertising and sales materials to study Pyrex glassware, she would not have revealed that users' enthusiasm for Pyrex glassware was sometimes followed by such complete disappointment if they opened the oven to find dinner a mess of shattered glass, that they did not take up the producer's offer of a money-back guarantee.²⁶ User-centered histories are therefore rich in sensory and emotional responses to goods, aspects that can otherwise be easily overlooked, yet which furnish social history narratives with greater detail and life.

However, chemical uses and misuses in the home, and therefore their domestic users and misusers, have been the subject of only a few limited types of history. The first type of historical narrative which has fleetingly featured domestic users deals primarily with the discovery or manufacture of chemicals. These narratives concentrate on the systematic, laboratory-based generation of knowledge and the industrial production of chemicals.²⁷ Company-focussed narratives have excluded women and children because the employees engaged in chemical handling have predominantly been men.²⁸ Although domestic use and

²⁴ David Edgerton, *The Shock of the Old: Technology and Global History since 1900* (Oxford: Oxford University Press, 2007), xi.

²⁵ Nelly Oudshoorn and Trevor Pinch (eds), *How Users Matter: The Co-Construction of Users and Technology* (London: MIT Press, 2005), 25.

²⁶ Regina Lee Blaszczyk, "Marketing Pyrex Ovenware," Chapter 10 in *Major Problems in American Business History*, ed. Regina Lee Blaszczyk and Philip B. Scranton (Boston: Houghton Mifflin Company, 2006), 326.

²⁷ Alan Rocke, *The Quiet Revolution: Herman Kolbe and the Science of Organic Chemistry* (Berkeley: University of California Press, 1993).

²⁸ William Reader, *Imperial Chemical Industries: A History* (Oxford: Oxford University Press, 1970).

misuse are alluded to, only very limited insights are provided,²⁹ especially when the voluntary use of chemicals is considered.³⁰

The second type of narrative are those where the interest in involuntary use leads to a focus on chemical exposure, whereby harm is always assumed. Symptoms can be correlated with recorded or expected exposure rates within workforces, therefore people who work with chemicals have constituted a useful observable population for which tolerance levels and protective measures in the workplace have been established, then applied in the home. In the case of lead, the occupational health of house painters provided a body of evidence about the effects of exposure to the chemical on which to base arguments against the interior use of lead paint in homes.³¹ However, women's and children's bodies are different to men's, and behaviours in private homes cannot be as easily controlled as in institutions or businesses. In the absence of surveillance and disciplinary strategies implemented in industry, how did people manage the safe and appropriate use of chemicals in the home? Examining domestic users foregrounds their actions to control chemicals as well as the efforts exerted by manufacturers, retailers and government.

These types of narrative that focus on the harm caused by chemicals and confront the stories of progress that chemists or business historians often promoted. For example, public health historians Gerald Markowitz and David Rosner have examined the archives of lead paint manufacturers, and were able not only to fill a gap in the literature, but to testify against the manufacturers in court.³² Their attentiveness to domestic users of chemicals as victims took the history of chemicals beyond the factory and boardroom. However, environmental histories such as this

²⁹ Carol Kennedy, *ICI: The Company That Changed Our Lives* (London: Paul Chapman Publishing, 1993).

³⁰ Peter Morris, "A Tale of Two Nations: DDT in the USA and the UK," in *Hazardous Chemicals: Agents of Risk and Change (1800 - 2000)*, ed. Elisabeth Vaupel and Ernst Homburg (Oxford: Berghahn Books, forthcoming).

³¹ Gerald Markowitz and David Rosner, *Deceit and Denial: The Deadly Politics of Industrial Pollution* (Berkeley: University of California Press, 2013).

³² Gerald Markowitz and David Rosner, "'Cater to the Children': The Role of the Lead Industry in a Public Health Tragedy, 1900-1955," *American Journal of Public Health* 90 (2000): 36-45.

are again concerned with “uninvited toxic trespass”,³³ that is to say the incidental or unintended passive exposure to chemicals, rather than their deliberate use.

Environmental historians and historians of public health have tended to ignore the demand expressed by users for affordable, vibrantly coloured, fashionable materials, and the fact that companies developed products in order to offer consumers dignity and liberty.³⁴ Instead, historians concerned with the environment and health have framed harm from chemicals as inevitable, and they have incriminated manufacturers with evidence of their actions to manipulate users into using products when there were indications that they were harmful.³⁵

I do not wish to diminish the importance of environmental histories and the pursuit of justice for the people who have experienced adverse effects, but these narratives about harmful chemicals dominate discussions about chemicals in general. Such accounts fail to account for the experiences of the majority of users who invited harmless as well as potentially toxic chemicals into their homes, and either appreciated or were indifferent to many of the products of the chemical industry. By examining innocuous chemicals as well as those that could be harmful, this thesis begins to address this imbalance.

The third type of narrative is concerned with the deliberate use of chemicals – as opposed to involuntary or incidental exposure – and their dramatic, life-changing outcomes. Historians of medicine have taken an inclusive approach to writing about chemicals, so have incorporated studies of the production of knowledge, the manufacture of chemicals, as well as what the users did and how chemical use was controlled. Pharmaceuticals, such as thalidomide, have had

³³ Jack Doyle, *Trespass Against Us: Dow Chemical & the Toxic Century* (Monroe: Common Courage Press, 2004) xii-xiii, 18; Bhavna Shamasunder, “Body Burden Politics: How Biomonitoring Data Is Influencing Chemicals Governance in the U.S,” (Ph.D., University of California, Berkeley, 2011), 12; Kate Davies, *The Rise of the U.S. Environmental Health Movement* (Lanham: Rowman & Littlefield Publishers, Inc., 2013), 143-144.

³⁴ Blaszczyk and Scranton, *Major Problems in American Business History*, xvi.

³⁵ Jock McCulloch and Geoffrey Tweedale, *Defending the Indefensible: The Global Asbestos Industry and Its Fight for Survival* (Oxford: Oxford University Press, 2008).

unexpected, harmful effects,³⁶ and drugs that crossed the threshold from medicinal to recreational use and abuse have been blamed for social problems.³⁷ Another aspect of the deliberate use of chemicals is their role as poisons. Historians researching poisonings have typically focused on pre-twentieth century periods, although Katherine Watson has brought the topic up-to-date with examples from the mid to late twentieth century.³⁸ This thesis considers how between the 1930s and 1980s the misuse of chemicals as poisons by a tiny minority impacted both narratives about chemicals in the home and the very availability of such substances.

The chemicals studied in this thesis were not prescribed, nor was access to them a matter of life or death, as could be the case with some pharmaceuticals. They were not involuntarily used, as chemicals in polluted air or from lead pipe infrastructures were. Instead, responsibility for choosing and using them was in the individual's hands and this aspect of individual agency has often been absent from historical research. By studying some chemicals that were innocuous and others that were ultimately hazardous, and chemicals that were tried and tested as well as those that were novel, a richer and more complete view of domestic chemical users can be achieved. Studying the uses and misuses of chemicals in the home is an opportunity to add depth and breadth to the current approaches to domestic chemical use, that is to say, beyond medical and environmental concerns.

Chemicals therefore, are not only the domain of chemists, and their history is not limited to their discovery and production, nor is it strictly the territory of one type of historian. Instead, chemicals are subjects suitable for integration into more general social histories because chemicals, along with all their domestic uses and misuses, are embedded in our everyday social history. A clean and hygienic home, presentable clothes and satisfying hobbies are important components of everyday

³⁶ Viviane Quirke, "Thalidomide, Drug Safety Regulation and the British Pharmaceutical Industry: The Case of Imperial Chemical Industries," Chapter 6 in *Ways of Regulating Drugs in the 19th and 20th Centuries*, ed. Jean-Paul Gaudillière and Volker Hess (Basingstoke: Palgrave, 2013), 181-205.

³⁷ Virginia Berridge and Griffith Edwards, *Opium and the People: Opiate Use in Nineteenth-Century England* (New Haven: Yale University Press, 1987).

³⁸ Ian Burney, "A Poisoning of No Substance: The Trials of Medico-Legal Proof in Mid-Victorian England," *Journal of British Studies* 38 (1999): 59-92; Katherine Watson, *Poisoned Lives: English Poisoners and Their Victims* (London: Hambledon and London, 2004).

life. Therefore, the chemicals, products and practices associated with ordinary domestic activities are worth studying.

Studying ordinariness through risk

The problem with researching everyday life is that much of it is unremarkable, so personal diary entries and letters merely mention ordinary events, instead of describe them in detail. Although instructional literatures can fill in the detail, they are models or guides, not records of what individuals actually did nor how they responded. This sterility led me to employ a more dramatic lens: narratives contained within news, memos, letters or literature that had been generated in response to unusual events and that showed evidence of attempts to manage risks. Such an approach has created a possible weakness in this thesis, because in order to engage with otherwise banal domestic chemical users, I have had to view them from the platforms created by spectacular instances of misuse. In doing so, I have risked over-politicising issues of chemical use. Remaining aware of the reasons why sources are available now has been necessary throughout research and a way of trying to access a middle ground where consumer agency is neither passive nor spectacular.³⁹

Nevertheless, domestic risks from chemicals are useful to study because they have remained consistent over time: burns (directly from caustic chemicals or indirectly from fires or explosions caused by chemicals), asphyxiation (mechanical or chemical) and poisoning. The number of chemicals, services and appliances present in the home that could harm people has greatly increased and correspondingly, the home has been viewed as a place of danger, contradicting the expectation for home to be a place of security and safety. For instance, disinfectants posed a dilemma because they could make homes safer when they killed germs and were used safely.

⁴⁰ However, disinfectants were also a threat to safety if they allowed germs to survive, or were drunk, poisoning or injuring the user.

³⁹ Matthew Hilton, "The Banality of Consumption," in *Citizenship and Consumption* ed. Kate Soper and Frank Trentmann (Basingstoke: Palgrave 2008), 87-103.

⁴⁰ Rebecca Whyte, "Preventing Accidents, Prioritising Health: Disinfectants, Disease and the Plurality of Risk," *Accidents and Emergencies*, conference paper Oxford Brookes University, 2013.

The use of disinfectant is a single example of the multitudes of everyday, chemical risks that threatened domestic users. In sociologist Ulrich Beck's *Risk Society*, generalised chemical risks loom large in the home. Beck's view that risk is inescapable is as applicable to catastrophic risks, such as nuclear devastation, as to the smaller, less noticeable risks embedded in the everyday choices of ordinary lives. Beck has characterised such risks as "stowaways of normal consumption", a description that emphasises how risks can be not immediately obvious, yet connected to the ordinary, small choices that consumers make, especially when they (and potentially even the producers) are ignorant about the possible effects of the substances available.⁴¹

A crucial component of risk that has been identified by Beck is that of indifference, a state that arises when everything is an unavoidable, unimaginable hazard, which ultimately gives rise to nothing seeming dangerous and people not wanting to think about hazards. Risks can be explained away, trivialised or denied and people become desensitised to them.⁴² Historians of technology have written about the domestication of technology, a key part of which is interpreting accidents in order to domesticate and manage the associated technological risks. Domestic users have not been the only actors in this process, because manufacturers, distributors and professional communicators such as journalists, authors and advertisers, have also been involved.⁴³ The domestication of risk entails learning to live with it, which in practice can involve some apparent inconsistencies.⁴⁴ This

⁴¹ Ulrich Beck, *Risk Society: Towards a New Modernity* (London: Sage Publications, 1992), 27, 36-37, 40, 45-46, 54.

⁴² Beck, *Risk Society*, 75, 83.

⁴³ Gooday, *Domesticating Electricity*, Introduction; Regina Lee Blaszczyk, *Imagining Consumers: Design and Innovation from Wedgwood to Corning* (Baltimore and London: John Hopkins University Press, 2000).

⁴⁴ Timothy Cooper, "Risk, Time and Everyday Environmentalism in Modern Britain," Chapter 7 in *Governing Risks in Modern Britain*, ed. Crook and Esbester, 162-165.

concept of domestication is important, because the home has traditionally been, if not entirely accurately, portrayed as a place of safety.⁴⁵

Accidents in the home

There has been a growing academic interest in accidents and safety at home, as well as at work. Judith Green's socio-historical study of accidents has described a conceptual shift in the way that accidents were regarded, from an inexplicable and unforeseeable event, to one that could be predicted and managed. This change was due to professional systems of record keeping and categorisation, which generated statistics about risk. Accidents were framed as occurring because individuals miscalculated risks or were entirely ignorant about them.⁴⁶ As daily life has required interactions with increasing amounts of technology, more risks have had to be learned about.⁴⁷

As well as individuals learning about risks, in Britain systems have been established to collect and share information about risks. For instance, the National Poisons Information Service (NPIS) was formed in 1963 to collate, hold and share information on poisons, in response to concerns about poisonings from pharmaceuticals and household chemicals.⁴⁸ Additionally, the Home and Leisure Accident Surveillance Systems (known as HASS and LASS respectively) were established in 1976, and collected information on visits to a sample of hospitals, indicates further interest in accidents.⁴⁹ The NPIS and HASS/LASS are inseparable

⁴⁵ Joel A. Tarr and Mark Tebeau, "Managing Danger in the Home Environment, 1900-1940," *Journal of Social History* 29 (1996): 797-816; John C. Burnham, "Why Did the Infants and Toddlers Die? Shifts in Americans' Ideas of Responsibility for Accidents: From Blaming Mom to Engineering," *Journal of Social History* 29 (1996): 817-837; Claire Langhamer, "The Meanings of Home in Postwar Britain," *Journal of Contemporary History* 40 (2005): 341-362.

⁴⁶ Judith Green, *Risk and Misfortune* (London: UCL Press, 1997), 196-197.

⁴⁷ John Burnham, *Accident Prone: A History of Technology, Psychology, and Misfits of the Machine Age* (London and Chicago: The University of Chicago Press, 2009), 7.

⁴⁸ R.J. Flanagan et al., "Developments in Toxicology - Retrospect and Prospect," *Human Toxicology* 7 (1988): 391-392; Nick Edwards, "The National Poisons Information Service," *Emergency Nurse* 10 (2002): 6.

⁴⁹ Barry Poyner and Nigel Hughes, *Home and Leisure Accident Research: Personal Factors in Domestic Accidents* (London: Department of Trade and Industry, 1980).

from the National Health Service, and further evidence of how central regulating risks is to governing.

These monitoring systems have confirmed that in comparison to other accidents, accidental poisoning with domestic chemicals occurred very infrequently which suggests successful risk management. Green has described three main methods of accident prevention which are relevant to the use of chemicals: education, enforcement and engineering.⁵⁰ Green viewed education as delivered by organisations and she defined enforcement as formal sanctions against risk taking behaviour, such as safety standards and legislation. Engineered solutions belonged to the domain of business, where chemists developed safer alternatives and producers improved packaging. In fact, each of these activities had ad hoc domestic counterparts, because inventive and common sense measures prevented accidents at home.

Historians have agreed that in the first half of the twentieth century, mothers were held responsible for managing risks in their homes: through controlling the environment and their children within it, their care, supervision and diligence prevented accidents.⁵¹ The increasingly technical home, with electricity, gas and automatic machines, was made a more work-like and potentially dangerous place, but unlike in industrial workplaces, safeguards could not be enforced in the home.⁵²

Domestic chemical users were also subject to distractions and demands which were eliminated from the workplace. Therefore, although young children have on the whole been absent from the twentieth-century British workplace, they have been at the heart of the twentieth-century British home. The interest that paediatricians had in the circumstances of accidental poisoning, such as the storage of domestic poisons and the locations in the home where the accident occurred,

⁵⁰ Green, *Risk and Misfortune*, 104-111.

⁵¹ John Burnham, "How the Discovery of Accidental Childhood Poisoning Contributed to the Development of Environmentalism in the United States," *Environmental History Review* 19 (1995): 57-81; Burnham, "Blaming Mom", 817-837, Tarr and Tebeau, "Managing Danger," 797-816.

⁵² Tarr and Tebeau, "Managing Danger," 797-816.

placed the user and their home, rather than the chemical or its manufacturer, at the centre of their investigations.⁵³

Children in the home are especially at risk

The attention paid to children's accidents by doctors, journalists and government indicates to historians that children were a special case when considering the domestic use of chemicals, and in stimulating protective measures. Young children were seen as uniquely at risk due to their lack of understanding about the world, but if children were protected the rest of the household would be too. Older children, who had developed manual dexterity and acquired some knowledge and patience which enabled them to follow instructions, were encouraged to use chemicals, for instance, to develop photographs. This pastime taught the importance of obeying instructions and using chemicals carefully. A good photographic print was the reward of proper use, whereas if chemicals were used incorrectly, films could be ruined or prints turned out blotchy. Nevertheless, even though children were not supposed to use some of the more potentially dangerous chemicals selected in this thesis' case studies, they did. Curiosity, mistakes and mischief all resulted in young chemical users being the subject of articles in newspapers and professional journals, and therefore available as evidence to historians. Children had more advocates among paediatricians and the home safety movement than adults operating outside the sphere of employment did, meaning that incidents involving children and chemicals occupy a great deal of this thesis.

What made children so important was that by the 1930s children were viewed as precious, emotionally priceless assets. Children had been largely withdrawn from the world of economic work, placed into compulsory education and had been increasingly invested with sentimental meaning. Zelizer has linked sentimentality towards children was concurrent with the domestication of women,

⁵³ T. McKendrick, "Poisoning Accidents in Childhood," *Archives of Disease in Childhood* 35 (1960): 127-133; Burnham, "Discovery of Accidental Childhood," *Environmental History Review* 19 (1995): 57-81.

who were increasingly likely to be, or to aspire to be, full-time mothers.⁵⁴ Although Zelizer could not construct a simple answer to the complicated question of whether increased concern and sentimentality for children contributed to, or was caused by, reduced mortality and improved longevity, it is clear that between the 1930s and 1980s children were to be cherished and protected at home.

Being sheltered from harm meant that children were often excluded from housework. Overall, clear references to children's involvement in household chores are limited. Technological improvements meant that children were able to withdraw their help from housework.⁵⁵ However, the opposite argument, that easy-to-use machines and safer chemicals may have allowed children to assume some responsibility, has scarcely arisen in any studies of the familial division of housework.⁵⁶

The main reason for my interest in children is that concern for their vulnerability to accidents with chemicals resulted in altered access to chemicals for all domestic users. Chemical accidents could happen to anyone in the home, not just children. Such grisly outcomes in the home were thankfully rare. Nevertheless, studying these occurrences with reference to the normal uses of chemicals is important in order to understand why users chose to interact with substances that could potentially harm them. Although fires and explosions happened as a result of misusing chemicals in the home, poisoning was the biggest threat, and is the dominant issue that runs through each chapter of this thesis.

⁵⁴ Viviana A. Zelizer, *Pricing the Priceless Child: The Changing Social Value of Children* (New York: Basic Books, 1985), 9, 11, 31.

⁵⁵ Ina Zweiniger-Bargielowska, *Women in Twentieth-Century Britain* (Harlow: Longman, 2001), 160.

⁵⁶ Neuhaus, *Married to the Mop*, 65.

Poisoning

*"It is more than likely that the annual global injury and number of deaths due to poisoning (excluding alcohol, hashish, opium and other addictions) exceeds by far the destruction which would be caused by an annual atomic bomb explosion in a heavily built up area."*⁵⁷

This arresting statement was made in 1957 by Lockett in his textbook *Clinical Toxicology*, and was borrowed the following year by the *British Medical Journal* (*BMJ*) to support further controls on the sale of poisons. When Lockett emphasised the scale of the problem by linking the damage done in domestic settings to the threat of devastation by nuclear war, he sent a clear message that poisoning should be taken seriously.⁵⁸

One must not exaggerate the importance of poisoning with domestic chemicals. Between the 1930s and 1980s, pharmaceuticals were the most prevalent causes of poisoning. Kessel has described how admissions to his hospital's ward in Edinburgh had changed: in the 1930s, patients had most often ingested corrosives and household chemicals, but from the mid-1940s drug overdoses had steadily displaced them (see Figure 1.1).⁵⁹ Although cases of poisonings from household substances occurred relatively infrequently compared to other drugs and medicines, they can help to understand domestic users' chemical practices and the availability of chemicals.

British doctors had long been aware of domestic accidental poisonings of children and adults, and in the 1950s they experienced anxieties regarding the unknown composition of modern consumer goods.⁶⁰ The imprecision with which chemicals were referred, for instance as "hydrocarbons", "insecticides", without naming the active chemicals reflects the lack of information encountered by doctors

⁵⁷ Lockett, quoted in John Glaister and Edgar Rentoul, "Drug Treatment of Disease: The Control of the Sale of Poisons and Dangerous Drugs," *BMJ* 2, (20 December 1958): 1524.

⁵⁸ *Ibid.*

⁵⁹ Neil Kessel, "Self-Poisoning: Part I," *BMJ* 2, (27 November 1965): 1268.

⁶⁰ T. McKendrick, "Poisoning Accidents in Childhood," 127-133.

trying to treat children poisoned by new, unfamiliar, consumer goods brought into the home.⁶¹

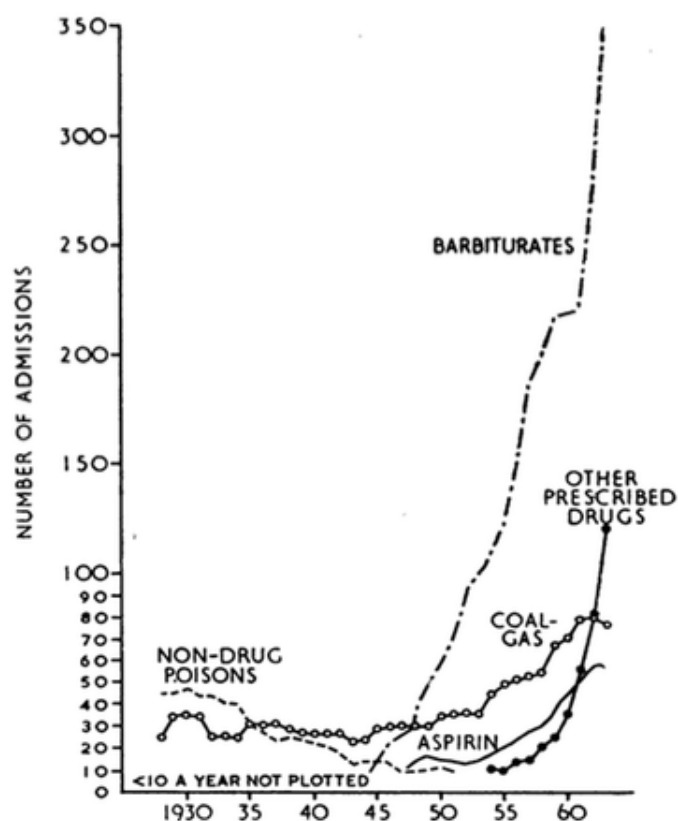


Figure 1.1: Graph showing the yearly admissions of poisoned patients in Edinburgh between 1928 and 1963, indicating decreased incidence of non-drug poisoning as all other methods increased.⁶²

Intentional poisoning

Poisoning with chemicals that were ordinarily used in the home was not always accidental. Suicide, expressions of distress (self-harm),⁶³ and when inflicted on another person or animal, cruelty and murder were all intentional uses of chemicals as poisons. These topics are important to include in this thesis, because the home was overwhelmingly where men and women took poison, or administered chemicals to others. Although murder with domestic chemicals has proved an attractive topic to researchers, the uncomfortable subjects of self-harm and suicide, which in Britain was decriminalised in 1961, may provide an explanation for many researchers' avoidance. Although suicide has been well studied and the availability

⁶¹ Burnham, "Discovery of Accidental Childhood Poisoning," 57-81.

⁶² Kessel, "Self-Poisoning: Part I," 1268.

⁶³ Chris Millard, *A History of Self-Harm in Britain* (Basingstoke: Palgrave Macmillan, 2015), 121.

of chemicals, usually through a profession, has been noted by several historians as a factor in suicide.⁶⁴ The persistent avoidance of access to chemicals ordinarily available in homes would suggest that the availability of chemicals was not important. However, this was not the case, as preventing suicide was central to doctors' and governments' arguments in the 1880s for regulating access to carbolic acid.⁶⁵ The persistent misuse of domestically useful chemicals and the futility of preventive measures underlies the absence of discussion about access to household chemicals.

Michael Clarke has studied the poisons used in British suicides.⁶⁶ The statistical evidence he drew upon suggested that women tended to use domestic substances for suicide, rather than scheduled poisons. This categorisation is problematic, as some scheduled poisons were also used as domestic substances, such as acids for cleaning, or cyanide to kill wasps. Nevertheless, this distinction has allowed Clarke to become interested in men's access to chemicals through particular occupations, a gendered aspect overlooked by histories that identified poisons as the most common means of suicide in women. However, Clarke has ignored the fact that poisonous chemicals were also employed in professions pursued by women, for instance when they worked in photographic darkrooms. For added complexity, the workplace and the home may have been the same place.

Clarke was particularly interested in suicide trends. In part, which chemicals were used relied upon the domestic availability of chemicals, such as carbolic acid. Nevertheless, availability was not the only factor. For instance, Lysol, which replaced carbolic acid as a safer alternative, was also employed in suicide. However, Clarke has noted a paradox without giving an explanation for the behaviour: when the sale of Lysol was relaxed and it was sold more widely, the number of Lysol suicides fell.⁶⁷

⁶⁴ John Maxwell Atkinson, *Discovering Suicide: Studies in the Social Organization of Sudden Death* (London: Macmillan, 1978), 13; Janet Padiak, "Death by Suicide in the British Army, 1830-1900" in *Histories of Suicide: International Perspectives on Self-Destruction in the Modern World*, ed. John Weaver and David Wright (Toronto: University of Toronto Press, 2009), 13, 126.

⁶⁵ Rebecca Whyte, "Public Health and Public Safety: Disinfection, Carbolic and the Plurality of Risk, 1870-1914," Chapter 6 in *Governing Risks in Modern Britain*, ed. Crook and Esbester, 137-138.

⁶⁶ Michael Clarke, "The History of Suicide in England and Wales, 1850-1961, with Special Reference to Suicide by Poisoning," (Ph.D., Oxford University, 1993), 97, 143, 173-174, 176.

⁶⁷ Clarke, "The History of Suicide", 244.

This puzzling situation demonstrated that it was not simply the availability or visibility of chemicals that encouraged misuse. News media raised awareness of, legitimised and perpetuated suicide methods, although researchers have declared that it was impossible to blame media reporting for “suicide contagion”, that is, clusters of suicide using the same method.⁶⁸ Reporting on suicide required a difficult balance between the media’s duty to inform, yet preventing their audience from learning too much or getting ideas, while remaining respectful of the person and people close to them. As late as 1970 a media ban was proposed to prevent reporting the poisons used, but since then poisons have nevertheless continued to be named.⁶⁹

In order to consider another explanation for the misuse of chemicals, I turn to Chris Millard’s work on the history of self-harm, which includes self-poisoning. He has traced the changing nature of self-harm in Britain, and situated it in the social landscapes of personal relationships and healthcare provision.⁷⁰ The rationale and practice of self-poisoning did not appear to be influenced by foreign trends, unlike self-cutting. Millard has drawn heavily on the findings of Edinburgh-based psychiatrist Neil Kessel, who noted a trend from domestic chemicals to drugs in cases of self-poisoning (Figure 1.1). Neither Kessel nor Millard have linked regulating chemical sales or any degree of toxicity of household chemicals to their use in signalling distress at social and personal situations. Instead, the prescribing habits of doctors, the lack of interest or care from pharmacy staff, and the ready availability of drugs were presented as the reasons why medicines replaced household chemicals in self-harm attempts. Coupled to prescribing medication to help patients is the unpleasant fact that, in some cases, the availability of those potent drugs led to self-poisoning. The displacement of non-pharmaceutical chemicals by drugs is only one aspect of the changing trends in self-harm, yet it is so neat that it has led to the neglect of other explanations. The next section deals with another deliberate misuse of chemicals as a poison, murder.

⁶⁸ Atkinson, *Discovering Suicide*, 156; Thomas E. Joiner, “The Clustering and Contagion of Suicide,” *Current Directions in Psychological Science* 8 (1999): 89-92.

⁶⁹ Clarke, “The History of Suicide”, 248.

⁷⁰ Millard, *A History of Self-Harm in Britain*.

Murder

Accounts of murders by poisoning, which occurred even more rarely than accidental or deliberate self-poisonings, and were limited to a narrower selection of chemicals such as arsenic and strychnine, have nevertheless received great interest from academics. Criminal poisonings generated and left documents that were archived and are now accessible to historians, or in the case of more recent proceedings, will eventually be available to historians. These records provide information about advances in chemical testing, debates about test reliability, and testimonies made in court. Additionally, the often scandalous personal stories made compelling news copy.⁷¹ Reportage from court proceedings was followed avidly in British homes, trials and verdicts were meticulously discussed by readers.⁷² However, detailed and extensive media coverage also planted the idea of using a particular chemical product as a poison in other people's minds.⁷³

Watson has argued that criminal poisonings during were reduced by continuously revising legislation which aimed to control the sale of chemicals. Nevertheless, murderous poisonings which required forethought and preparation continued, which is a testament to the "resolve to kill" that Watson described as uniting poisoners through time.⁷⁴ The next section explores some of the legislative measures that aimed to prevent poisoning and ensure the safe use of chemicals in the home.

Anticipating and Controlling Risks

Table 1.1 illustrates the sustained interest in protecting users from chemicals, and highlights the fact that the period between the 1930s and the 1980s was punctuated by the introduction of British regulations that aimed to improve the information available to users. The timeline lists the most relevant measures for this

⁷¹ Watson, *Poisoned Lives*; Ian Burney, "A Poisoning of No Substance," 59-92.

⁷² John Carter Wood, "'Those Who Have Had Trouble Can Sympathise with You': Press Writing, Reader Responses and a Murder Trial in Interwar Britain," *Journal of Social History* 43 (2009), 339-462.

⁷³ Clair Scrine, "'More Deadly Than the Male' The Sexual Politics of Female Poisoning: Trials of the Thallium Women," *Limina* 8 (2002):127-143.

⁷⁴ Watson, *Poisoned Lives*, 218-219.

thesis, so omits those that were primarily concerned with cosmetics and foods. Although the application and ingestion of such substances influenced general attitudes to chemicals, they are beyond the scope of this thesis. The timeline also demonstrates the influences from Europe, as Britain prepared to enter, then joined the European Economic Community (EEC) in 1973. Harmonisation with other member states was necessary to ensure a common market for chemical products and for agricultural harvests that carried chemical residues.⁷⁵

However, as Table 1.1 shows, a system for testing agricultural products in order to predict their effects on human and in some cases environmental health had been agreed between British chemical companies and the government long before European harmonisation became an issue. More detailed information, including about toxicological data, had been increasingly demanded in the 1950s and 1960s, in conjunction with tighter regulation of chemicals used in agriculture and medicine, but not necessarily all potentially harmful chemicals. The system addressed the concern that many new chemicals had been put on the market without anything being known about their toxicity, so the measure existed mainly to reassure users that their safety was being considered. Indeed, Beck has complained that in the absence of any true understanding of a chemical's long term effects, regulations were merely "symbolic tranquilisers", rather than an effective management of issues.⁷⁶ Policy analysts have shown that improved safety was not the motivation for Britain's Food and Environmental Protection Act in 1985, but rather a desire to present administrative credibility.⁷⁷

Continuing to think about motivation, the third column of Table 1.1, titled "Intention", illustrates why the formal measure was required, and therefore it often also indicates that actions of domestic users informed the need for the Act. Studying the intentions shows that there were two main methods to protect users: better information provision and sales restriction.

⁷⁵ Nigel Haigh, *EEC Environmental Policy and Britain* (Harlow: Longman, 1989), 207-211, 216.

⁷⁶ Beck, *Risk Society*, 68.

⁷⁷ David Gilbert and Richard Macrory, *Pesticide Related Law* (Farnham: The British Crop Protection Council, 1989), 62.

Table 1.1 Timeline of control measures relating to chemicals in Britain

Date	Regulation	Intention
1851	The Sale of Arsenic Act	To prevent accidental and secret poisoning with arsenic.
1852	Pharmacy Act (and further iterations in 1868 and 1908)	To protect the role of trained pharmacists and prevent accidental poisonings.
1933	Pharmacy and Poisons Act	To prevent accidental poisonings.
1935	Poisons Rules in relation to the Pharmacy and Poisons Act	To encourage the use of “non-toxic” preparations at home, and limit which retailers could sell poisonous products and to whom.
1941	Sale of Prohibited Substances	To prevent sabotage by monitoring and restricting the sale of poisons and chemicals which could be used in explosives.
1957	Pesticide Safety Precautionary Scheme	To improve agricultural chemical users’ safety through a formal but voluntary process of scrutiny. Domestic users were reassured.
1967	Farm and Garden Chemicals Act (eventually enacted in 1973)	To empower users to choose or avoid a product through knowing the name of its active compound. Demonstrated government awareness of perceived problems with pesticides.
	European Framework Directive on Dangerous Substances	To introduce a system for classifying, listing, packaging and labelling chemicals, but did not restrict uses or users.
1972	Poisons Act	To separate non-medicinal poisons, i.e. household and agricultural, from medicinal poisons. No apparent effect on users.
1978	Consumer Safety Act	To protect and empower users through the codification of their needs: appropriate information, warnings and instructions, packaging and safe contents.
1985	Intoxicating Substances (Supply) Act	To prevent deaths from solvent abuse, the sale of aerosols and solvents restricted to purchasers over 16 years old.
	Food and Environment Protection Act	To bring pesticide approval and registration into line with Europe, the PSPS was superseded by FEPA. No longer voluntary.
1987	Consumer Protection Act	To protect users, ministers were empowered to investigate and prohibit the supply of products deemed to be unsafe.

Table 1.1 Timeline of control measures relating to chemicals in Britain

A key argument that legislators made on behalf of users was that they should be able to make informed choices about products and that in order to do that, they should know what chemicals they contained. That is to say, users should be told the name of the chemical, whether any danger was associated with it and if so, what precautions they ought to take. These demands for information were at the heart of the Farm and Garden Chemicals Act, the Consumer Safety Act and the European Framework Directive for Dangerous Substances. Restriction of the sale of chemicals proscribed by the Sale of Arsenic Act and the Intoxicating Substances (Supply) Act may have prevented some accidents. However, these Acts addressed deliberate misuse, specifically criminal poisoning and solvent abuse, and those misusers were highly motivated to employ chemicals for such purposes. Therefore, misusers were not always successfully deterred by the Acts' easily circumvented restrictions. Understanding the practices of domestic users and misusers illuminates how certain types of harm from chemicals continued to occur in the wake of what were expected to be protective efforts.

Table 1.1 has listed some of the legislative measures put in place that anticipated and attempted to control risks associated with the use of chemicals at home. Arsenic and carbolic acid are examples of specific chemicals that sparked concern about accidental poisoning, the use of poison to murder and as a means of suicide, and stimulated regulatory actions. Table 1.1 shows that between the 1930s and 1980s other risks, including intoxication and explosions, have been responded to through legislation. Fatal poisoning was no longer the only problem. The shocking teratogenic effects on babies born to mothers who used thalidomide during pregnancy in the late 1950s are the epitome of the unintended and unexpected effects of new chemicals. Thalidomide birth defects have been held up as a reason for extensive pre-market testing, but also as an example of the limitations of testing, as the congenital effects had initially not been detected in the animal test species used.⁷⁸ In addition, some chemicals have effects that only become apparent later in life, such as the susceptibility to developing cancers seen in the women exposed in

⁷⁸ Quirke, "Thalidomide, Drug Safety Regulation and the British Pharmaceutical Industry," 181-205.

utero to diethylstilbestrol (DES).⁷⁹ Nevertheless, the early 1990s were the threshold of a discernible change in attitude towards the possibility of chemicals as endocrine disruptors.⁸⁰ Therefore, this transition makes a useful boundary and justification to end the research for my thesis in the 1980s.

Table 1.1 also indicates it is important to acknowledge a change in awareness and attitude towards the environmental impacts of chemical use, which helps to explain perceptions of chemical risks. Although this thesis will not focus on environmentalism, the environment cannot be considered as totally separate from domestic concerns. For instance, smog seeped into homes⁸¹ and beachgoers tracked oil into their homes after visits to polluted coastlines.⁸² Reinforcing the growing awareness in Britain of chemical side-effects and pollution, such as killer smogs in the 1950s, Rachel Carson's 1962 book *Silent Spring* linked new pesticides to human diseases and wildlife devastation.⁸³

The business and politics associated with regulating chemicals has been the subject of sustained academic interest.⁸⁴ International comparisons of pharmaceuticals, environmental pollution and agricultural pesticides illuminated the complex global chains of influence and action that have informed policies concerned with chemicals. Marian Jones and Isidor Benrubi's historical study of the regulation of household chemicals in America is a rare example of on this subject. Their study has demonstrated the effectiveness of compulsory over voluntary warning labels. Although Jones and Benrubi have praised Britain's medicines labelling, in the 1920s

⁷⁹ Nancy Langston, "The Retreat from Precaution: Regulating Diethylstilbestrol (DES), Endocrine Disruptors and Environmental Health," *Environmental History* 13 (2008): 41-65.

⁸⁰ Sarah Vogel, "From 'the Dose Makes the Poison' to 'the Timing Makes the Poison': Conceptualizing Risk in the Synthetic Age," *Environmental History* 13 (2008): 667-673.

⁸¹ Bill Luckin, "The Heart and Home of Horror': The Great London Fogs of the Late Nineteenth Century," *Social History* 28 (2003): 31-48; "An Anti-Smog Bottle," *BMJ* 2 (1955): 1135.

⁸² Cooper, "Risk", 164.

⁸³ Mark Wilson, "'To What Extent Was the British Reaction to 'Silent Spring' Indicative of a Tradition of Top-Down Environmentalism?'," (M.Sc., University of Northumberland, 2010).

⁸⁴ Ronald Brickman et al., *Controlling Chemicals: The Politics of Regulation in Europe and the United States* (Ithaca: Cornell University Press, 1985); David Vogel, *The Politics of Precaution: Regulating Health, Safety, and Environmental Risks in Europe and the United States* (Princeton: Princeton University Press, 2012); Soraya Boudia and Nathalie Jas (eds), *Powerless Science? Science and Politics in a Toxic World* (New York: Berghahn Books, 2014).

the Americans took a more comprehensive view of the uses of chemicals in the household, demonstrated by the Caustic Poison Act (1927) and the proposed but unsuccessful Volatile Poisons Act. The examples used by Jones and Benrubi show that the regulatory efforts in both Britain and America were limited to improving the information available to users, rather than demand that changes made to the products. Predictably, manufacturers resisted precautionary labelling, claiming that marking their products as poisons, which as far as they knew had been used without injury, would “kill” sales.⁸⁵ There was no evidence that users requested or campaigned for change, instead the changes were driven by doctors, who treated injuries from harmful products, and by legislators. Protecting children from mistakenly ingesting chemicals was the most important motivation behind these regulations.

As Table 1.1 reiterates, the domestic use and the regulation of chemicals began before the 1930s, and the types of poisonings – accidental, suicide and murder – that had occurred with arsenic and carbolic acid were seen with other chemicals. Therefore, in order to contextualise the case studies that are presented in later chapters and facilitate the identification of changes and continuities, I will briefly review some of the research on arsenic and carbolic acid, because they were used in the home throughout the 1800s and were the first chemicals to be scrutinised and regulated. Users, in the form of poisoning statistics, were at the heart of regulatory measures for these two chemicals.

The first chemical to be regulated in Britain: Arsenic

The earliest and perhaps best-known effort to control the sale of chemicals to domestic users was the 1851 Arsenic Act. Arsenic was used in the home as a pest killer, amongst many other applications.⁸⁶ Yet despite some users benefitting from their access to such a chemical without harming others, there were others who carelessly allowed it to contaminate nearby goods, or used it deliberately to murder.

⁸⁵ Marian Moser Jones and Isidor Daniel Benrubi, “Poison Politics: A Contentious History of Consumer Protection against Dangerous Household Chemicals in the United States,” *American Journal of Public Health* 103 (2013): 801-812.

⁸⁶ James Whorton, *The Arsenic Century: How Victorian Britain was Poisoned at Home, Work and Play* (Oxford: Oxford University Press, 2010), Chapters 10 and 11.

None of these detrimental uses were avoided simply by regulating who could buy or sell the chemical. The government had to be seen to take protective actions on behalf of all citizens.⁸⁷

News media and Victorian literature which sensationalised the fear of secret, criminal poisoning with arsenic, were important in securing the passage of the 1851 Arsenic Act. This Act required the vendor to know the arsenic buyer, to record their name, address and intentions in a poisons book, and as originally suggested in 1819, specified that soot or indigo should be used to colour the white arsenic powder, in order to prevent it from being mistaken for any number of harmless white powders, such as flour, baking powder and sugar, both at the point of sale and at home. However, agricultural arsenic preparations did not have to be coloured, nor did arsenic destined for medicines because the colourant might interfere with the intended effects. Coupled with users' readiness to lie in order to obtain arsenic, the Act was by no means difficult to circumvent. The Act was also hard to enforce: it was not a responsibility accepted by the police force, and the Pharmaceutical Society had to sponsor private investigations into vendors they suspected of not upholding the sales restrictions.⁸⁸ Without effective enforcement, an Act was essentially a statement of intent.⁸⁹ Ultimately the most important outcome of the Arsenic Act was not a reduction in the incidence of poisoning, but the coupling of poisons to pharmaceutical regulation.⁹⁰

Disinfection and dilemma – carbolic acid

After arsenic, the disinfectant carbolic acid was the next chemical to generate significant debate and legislative effort between the 1880s and 1900. Cheap, crude carbolic acid had been sold from unregistered grocers and oilmen as well as distributed free at times of epidemic disease by local authorities, in

⁸⁷ P.W.J. Bartrip, "A 'Pennurth of Arsenic for Rat Poison': The Arsenic Act, 1851 and the Prevention of Secret Poisoning," *Medical History* 36 (1992): 53-69.

⁸⁸ Whorton, *The Arsenic Century*, Chapter 5.

⁸⁹ Stuart Anderson and Virginia Berridge, "Drug Misuse and the Community Pharmacist: A Historical Overview," in *Drug Misuse and Community Pharmacy*, ed. Janie Sheridan and John Strang (London: Taylor and Francis, 2003), 18.

⁹⁰ Bartrip, "The Arsenic Act 1851", 68-69.

household containers which inevitably were not kept in safe places. Chemists argued that the presence of carbolic acid in grocers' shops made the chemical seem safe to users, whereas restriction to a chemists' shops would have discouraged complacency in handling the disinfectant.⁹¹ Despite its strong and distinctive smell, carbolic acid was mistakenly ingested, and its reputation as an effective poison ensured that it was increasingly taken up as a sure, although agonising, method of suicide. Deaths from accidental and deliberate ingestion of carbolic acid grew steadily between the 1860s and the 1880s from hardly any cases to nearly 100 every year, then rose rapidly to over 250 a year by 1895.⁹² Whereas the motivation behind the Arsenic Act was to prevent murder, in the case of carbolic acid deliberate self-poisoning galvanised measures to control its sale. The next section considers in more detail how domestic users bought chemicals and the responsibility retailers were expected to have regarding determining appropriate customers.

Access to chemicals: Retail

Focusing on the moment of sale, rather than on either the behaviour of the twentieth-century chemical user in their private home or the inherent properties of chemicals, was easier for retailers and the government to attempt to limit harm. Despite this important point, detailed histories of the retail of chemicals that were not drugs,⁹³ or medicines⁹⁴ and were used at home, have been elusive. Sources that might have contained such evidence, for instance, a collection of interviews with community pharmacists,⁹⁵ contain very little information on domestically used chemicals.

Moving away from the chemist's shop and the retailers' view, other researchers have concentrated on the perspectives of grocery shoppers. However,

⁹¹ Whyte, "Public Health and Public Safety", 128.

⁹² *Ibid* 139.

⁹³ Berridge and Edwards, *Opium and the People*.

⁹⁴ Susan Whyte et al., *Social Lives of Medicines* (Cambridge: Cambridge University Press, 2002).

⁹⁵ British Library *Oral History of Community Pharmacy* collection comprising 101 interviews conducted or arranged by Stuart Anderson.

they focused on the social rituals of shopping such as gossiping.⁹⁶ Mundane household requisites such as chemicals or products for cleaning were not memorable to oral history participants, or not considered important enough to emerge as a theme. The introduction of self-service grocery shopping⁹⁷ might be expected to have had an impact on how domestic chemicals were selected, but chemicals have again been overlooked. Justifications for greater focus on foods and medicines may be found in researchers' personal interests, the available archives or preserved material culture, the emotive potential of food, or even the greater proportion of expense on food, but the retail and regulation of non-medicinal chemicals are definitely under-represented and deserve further study.

The fact that a wide selection of chemicals, not just branded packaged products, were readily available for home use before 1930 is evident from shop inventories. Historians of retail have compiled lists of goods that convey the extensive variety and the apparently disorderly nature of shops where poisons nestled among innocuous substances. An 1853 guide for stocking a general store, listed items that were still sold by general stores in 1910.

“...Epsom salts...black lead, paste blacking, starch, grits, night-lights, oxalic acid, sweet oil, soda, sandpaper, bath brick, Fullers' earth, matches, soap, blue... phosphorous paste for rats, ink and bug-poison...”⁹⁸

Although this list emphasised the miscellany of chemicals, it gave no clues as to how transactions proceeded, nor the items' users or user. The story of what consumers did is a missing link that would unite histories of revolutions in retail and

⁹⁶ Peter Gurney, “Co-Operation and the ‘New Consumerism’ in Interwar England,” *Business History* 54 (2012): 905-924.

⁹⁷ Jane Hamlett et al., “Regulating UK Supermarkets: An Oral-History Perspective,” <http://www.historyandpolicy.org/policy-papers/papers/regulating-uk-supermarkets-an-oral-history-perspective> (access date 23 March 2016); Peter Gurney, “Co-Operation,” 905-924; David McCarthy et al., *UK Supermarkets* (Manchester: Centre for Business Research, 1983). 15.

⁹⁸ W. Hamish Fraser, *The Coming of the Mass Market, 1850-1914* (Hamden: Archon Books, 1981), 101.

consumption.⁹⁹ The assumption that chemical ingredients were displaced by mass-produced branded preparations is an example of one such revolution.¹⁰⁰

An example of what consumers did with chemicals is given in Watson's study of Victorian vitriol throwers. Vitriol was the common name for concentrated sulphuric acid, bought cheaply from oilshops in the 1850s, often in teacups or basins, and it was diluted at home for cleaning metal. However, the chemical was also used in assaults, when it was thrown at the victim's clothes or face. The incidence of vitriol throwing waned after the 1890s, which was before strong mineral acids were added to the list of scheduled poisons laid down by the Pharmacy Act. Therefore, the practice of vitriol throwing was not wholly dependent on the availability of the chemical. Cultural components, that is to say knowledge about and a shared social meaning of acid attacks, were factors too.¹⁰¹ Nevertheless, the crime of vitriol throwing has provided an opportunity to consider the domestic uses, misuses and users of chemicals.

Already we have seen evidence of chemicals that are unfamiliar in the home today. In addition to the shifts in the types of chemicals and products available, the places where domestic users bought chemicals also changed. For instance, the oilshops that sold small quantities of loose goods "a ha'porth of this, a ha'porth of that," which suited their customers' ability to pay.¹⁰² The mass-production of packaged products determined the goods available in shops, and brought a new degree of order and odour control to the previously cluttered retailers.¹⁰³ Histories of mass retailing have relied on the heavily advertised, neatly portioned and packaged soaps and grate polishes to represent chemicals. However, the washing soda and chemicals that were weighed out by shopkeepers and used at home as

⁹⁹ Jon Stobart, "A History of Shopping: The Missing Link between Retail and Consumer Revolutions," *Journal of Historical Research in Marketing* 2 (2010): 342-349.

¹⁰⁰ Fraser, *The Coming of the Mass Market*, 57; James B. Jeffreys, *Retail Trading in Britain 1850-1950* (Cambridge: Cambridge University Press, 1954), 134, 380.

¹⁰¹ Katherine Watson, "Is a Burn a Wound? Vitriol-Throwing in Medico-Legal Context, 1800-1900," in *Lawyers' Medicine: The Legislature, the Courts and Medical Practice 1760-2000*, ed. Imogen Goolld and Catherine Kelly (Oxford: Hart Publishing, 2009), 63.

¹⁰² Jeffreys, *Retail Trading in Britain*, 127.

¹⁰³ *Ibid*, 127, 134, 380, 382.

stain removers to combat the “inevitable grime” of industrial, twentieth-century Britain were neglected.¹⁰⁴ Domestically used chemicals that were not advertised with novel, enticing images or in convenient, durable containers deserve further study, and this thesis uses multiple sources to elaborate on the simplistic representation of their displacement by packaged branded products.

A richly researched commodity which can be considered as having parallels to chemicals is tobacco, studied in great depth by Matthew Hilton. Like many dry chemicals, tobacco was sold by weight and loose tobacco was increasingly replaced by packaged, branded forms. Packets of cigarettes, which came to dominate the tobacco market in the 1930s, could be sold by any untrained person, but did not completely displace loose tobacco as sold by skilled, knowledgeable tobacconists. The adaptive strategies employed by tobacconists to highlight products other than cigarettes, such as promoting the pipe as “The Everyday Sign of Manhood” did not have analogues in the retail of chemicals to domestic users.¹⁰⁵ As for chemists and druggists, they were increasingly busy fulfilling National Insurance prescriptions, introduced in 1911. Their heavy workload reduced their capacity to weigh or measure then package non-medicines, so in order to focus on handling prescriptions, they preferred to sell conveniently packaged household goods.¹⁰⁶

Not only were packaged goods convenient, they carried messages. Surprisingly, although the origin in the 1860s of a standardised British poison bottle has been traced back to the pharmaceutical firm Allen & Hanbury’s,¹⁰⁷ this story is absent from an otherwise comprehensive history of the company.¹⁰⁸ The communicative role of packaging not only reinforced warnings, but for harmless chemicals it replaced expertise and customer contact. However, although Allen &

¹⁰⁴ Fraser, *The Coming of the Mass Market*, 57.

¹⁰⁵ Matthew Hilton, “Retailing History as Economic and Cultural History: Strategies of Survival by Specialist Tobacconists in the Mass Market,” *Business History* 40 (1998): 115-137.

¹⁰⁶ Stuart Anderson, *Making Medicines: A Brief History of Pharmacy and Pharmaceuticals* (London: Pharmaceutical Press, 2005), 89-91.

¹⁰⁷ W.A. Campbell, “Oxalic Acid, Epsom Salt and the Poison Bottle,” *Human & Experimental Toxicology* 1, (1982): 187-193.

¹⁰⁸ Geoffrey Tweedale, *At the Sign of the Plough: 275 Years of Allen & Hanburys and the British Pharmaceutical Industry, 1715-1990* (London: J. Murray, 1990), 70, 108.

Hanbury's extensive printing and packaging department was described, changes in regulation, shopping behaviour or customer preferences for branded, packaged goods were not discussed.¹⁰⁹ Additionally, packaging was also given another job by manufacturers, that of providing "automatic" safety. In the 1970s, child-resistant pill bottles reduced the risk of poisoning without having to educate or warn anyone.¹¹⁰ Packaging design was believed to be more effective and cost efficient than educating users, making manufacturing and packaging standards a key target for safety campaigners.¹¹¹

Nevertheless, the adoption of child-resistant packaging was slow, piecemeal and contentious. For instance, the meaning of packaging had to be learned and it added to warnings, rather than replaced them. In Britain, child-resistant packaging was limited to pharmaceuticals until the mid 1970s, when Johnsons Wax became the first company to use child-resistant closures.¹¹² Child-resistant packaging was also blamed for complacency among adults, who depended on the engineering solution instead of participating in the creation of safety by storing their poisons safely.¹¹³ However, the topic of child-resistant packaging has not engaged the attention of many historians, who have been more interested in the negotiations between governments, manufacturers and citizens that shaped the regulation of drugs, pharmaceuticals and occupational exposure to chemicals. Yet although improved packaging and labelling were relatively superficial changes, they were more achievable than demanding safer chemicals.

The impetus for improved packaging and labelling came from consumer and advisory groups. The increased complexity of chemical products, as well as

¹⁰⁹ Tweedale, *At the Sign of the Plough*, 134-135, 138-139.

¹¹⁰ Burnham, "Blaming Mom," 817-837.

¹¹¹ R.H. Jackson and A.W. Wilkinson, "Why Don't We Prevent Childhood Accidents?" *BMJ* 1 (1976): 1261.

¹¹² Elizabeth Towner et al., *Reducing Childhood Accidents: The Effectiveness of Health Promotion Interventions, a Literature Review* (London: Health Education Authority, 1993), 24, 30-31; "UK Resists Child-Resistant Packages for Pills," *New Scientist* 62 (25 April 1974): 171.

¹¹³ W. Kip Viscusi, "Consumer Behavior and the Safety Effects of Product Safety Regulation," *Journal of Law and Economics* 28 (1985): 544.

mechanical appliances, has meant that consumers have demanded guidance,¹¹⁴ and an advice industry has grown to meet this need. Historians have thoroughly researched consumer advocates and associated the emergence of the Consumers' Association with the rise of economic affluence in Britain.¹¹⁵ Consumer groups evolved from amateurs who sat on pro-business committees and promoted the position that consumers were responsible for discriminating between good and bad purchases, to a professionalised group of product testers, journalists and lobbyists, who sought greater government intervention to manage product safety and improve the quality of information manufacturers provided to consumers.¹¹⁶ The highly differentiated division of labour that is associated with complex systems of business, politics, agriculture and law was, according to Beck, responsible for a perceived shift away from individual responsibility for managing risks.¹¹⁷ However, rejection of responsibility was by no means a uniform response from users to the proliferation of available chemicals, as this thesis will show.

To begin to investigate the chemicals and users at the centre of my research, I turn to museums, which act as cornerstones of the nation's collective memory. In Chapter 2, I examine how chemicals used to clean, kill weeds and develop photographs have been displayed, and their users represented, in several different museums. Then I explore the variety of other sources that have better revealed the domestic users, and their uses and misuses of chemicals.

¹¹⁴ Kaj Ilmonen, "Sociology, Consumption and Routine," in *Ordinary Consumption*, ed. Jukka Gronow and Alan Warde (London: Routledge, 2001), 18.

¹¹⁵ Lawrence Black, "Which? Craft in Post-War Britain: The Consumers' Association and the Politics of Affluence," *Albion: A Quarterly Journal Concerned with British Studies* 36 (2004): 52-82.

¹¹⁶ Hilton, *Consumerism in Twentieth-Century Britain: The Search for a Historical Movement* (Cambridge: Cambridge University Press, 2003), 171, 181, 189-190.

¹¹⁷ Beck, *Risk Society*, 33.

Chapter 2: Sources and Methods

Chemicals are part of everyday life, but they have not usually been considered of sufficient interest to warrant comment, by either users themselves or academics, which has resulted in a paucity of either descriptive or analytical secondary literature.¹ Therefore, a patchwork of diverse primary documentary and material sources is used to reveal the motivations and constraints that acted together to influence how domestic chemical use changed between the 1930s and the 1980s. This chapter details the types of evidence that this thesis is built upon. I begin at a macro-scale by looking at examples of how chemicals and their users are represented in museums and considering what factors influence museums that collect and display chemicals. Much of the curiosity and inspiration that drove this project was inspired by my experience of working in and visiting museums. In the museums I visited, the chemical users are barely detectable so to better access the users, I drilled down through advice literature, advertisements and personal testimonies.

Objects and museum collections

Physical objects can enrich the ways one can think about the things themselves, as well as the people who produced, bought, gave and used them. Objects provide information that is not otherwise available to researchers in written texts or photographs, and objects elicit questions from researchers. Studying objects in conjunction with texts means that practices can be better imagined and understood.² This thesis is concerned with the uses and misuses of chemicals, or in other words, practices which depend on things,³ so looking for representations of chemicals was part of looking for their related practices. Collecting and displaying objects does not automatically lead to the full variety of practices associated with those objects also being revealed to museum visitors.

¹ Ann Smart Martin, "Makers, Buyers and Users: Consumerism as a Material Culture Framework," *Winterthur Portfolio* 28 (1993): 141-157.

² Leora Auslander et al., "AHR Conversation: Historians and the Study of Material Culture," *The American Historical Review* 114 (2009): 1354-1404.

³ Frank Trentmann, "Materiality in the Future of History: Things, Practices and Politics," *Journal of British Studies* (2009): 147-158.

By collecting and displaying objects, museums present an authoritative version of history that is often unchallenged by visitors. That is not to say visitors do not question what they see in museums, because perceived bias and errors in interpretation stimulate questions about the museum's aims, and objects prompt conversations and personal reflections among visitors.⁴ However, the topic that is often missing from visitors' discussions is the choice behind each item on display because, as Sharon Macdonald has argued, "exhibitions are presented tidily to the public as unequivocal statements, rather than as outcomes of processes laden with assumptions, chance, and compromises".⁵ What then might have led to chemicals used in the home being underrepresented in museums?

Survival bias, the fact that certain types of objects survive and can therefore be collected and exhibited, goes some way to explain this. Additionally, the idea of displaying powders, crystals and liquids can appear to be boring, or there may be fears about the safety of doing so. For instance, soaps and complex synthetic laundry detergents are non-threatening types of chemicals, often associated with visually engaging advertisements, so have become a shorthand in museum displays for laundry and housework. Their high visibility in museums is matched by academic interest and publications.⁶ Yet these products are only one strand of the stories about some of the chemicals used to clean clothes, let alone for other purposes in the home.

Further reasons behind the missing chemicals can be found in museums' collecting policies and processes, as well as their aims. Museums rely on donations of objects. Sometimes donations come directly from manufacturers. However, many objects are donated by individuals because they were originally expensive and their previous owners or users cannot bear to discard what represents a large expenditure.

⁴ Gaynor Kavanagh, *Making Histories in Museums* (London: Bloomsbury Publishing, 2005), xi, 2.

⁵ Sharon Macdonald, *The Politics of Display: Museums, Science, Culture* (London: Taylor & Francis, 2010), 2.

⁶ Victoria Kelley, *Soap and Water: Cleanliness, Dirt and the Working Classes in Victorian and Edwardian Britain* (London: Tauris, 2010); Jessamyn Neuhaus, *Housework and Housewives in Modern American Advertising: Married to the Mop* (New York: Palgrave Macmillan, 2011); Lydia Martens and Sue Scott, "'The Unbearable Lightness of Cleaning': Representations of Domestic Practice and Products in Good Housekeeping Magazine (UK): 1951-2001," *Consumption, Markets and Culture* 8 (2005): 379-401; Sarah Pink "Dirty Laundry. Everyday Practice, Sensory Engagement and the Constitution of Identity," *Social Anthropology* 13 (2005): 275-290.

Objects that were not especially significant, precious or treasured, that were inexpensive, everyday items have been far more likely to be discarded as waste, rather than donated to a museum. Robert Opie, founder of the Museum of Brands (MoB), London, has stressed the fact that he created his unique collection by saving the packaging that users usually throw away.⁷ Before the popularity of online auction places such as eBay, which has amplified the market for mass-produced collectables, curiosities and “vintage” ephemera, curators have often had to work harder to represent the everyday. In fact, eBay is often a better research tool than museum catalogues because of the objects’ detailed descriptions, good photographs and the user-friendliness of the selling platform. A drawback of relying on saved advertising or packaging is that unbranded products that were not advertised, and chemicals which were retailed “loose”, in disposable, fragile paper bags become obscured from memory.

The MoB has displayed the everyday, consumer chemicals arranged as they would have been in the home, in period rooms or pantry-style displays.⁸ A box of Imperial Chemical Industries banded washing soda, studied in Chapter 3, was visible inside a washing machine, but surprisingly none of the other products examined in this thesis were present. A few products were separately presented in series to illustrate changes and continuities in their packaging over time. Displays like these tapped into visitors’ brand recognition and nostalgia. The distinctive shapes and colours that became identified with a particular product endured as the packaging became modernised and plastics replaced glass, metal and cardboard. However, the interpretive texts presented by the museum said nothing about the contents of such packages, nor how often they were bought, or how they were regarded by the user. Instead, these questions were left unsaid and the visitors were inspired to remember these items in their homes, or those of their grandparents.

In contrast to the familiar items at the MoB, the Science Museum aspires to showcase “the most important relics of the past, the most significant products of the present and indicators of the future”. Regarding the aims of the Science Museum, for

⁷ Simon Frith, “In Search of Our Throwaway History with Robert Opie”, (Throwaway Productions Ltd, DVD) 2013.

⁸ 14 November 2012, Museum of Brands, Colville Mews, London W11 2AR. The museum has moved to a new location and redisplayed since I visited.

example, the curator Robert Bud has explained that “a profound and enduring tension between pure science, applied science and technology” has shaped its collections.⁹ At the Science Museum, chemicals have tended to be presented as belonging within laboratories, involved in experiments or in manufacturing.¹⁰

That is not to say chemicals that were used at home are absent from the Science Museum, but the stories of ordinary users do not tend to be prioritised. Take the example of a display that includes paraquat, a weedkiller studied in Chapter 4. Figure 2.1 shows a variety of pesticides, all supplied by Plant Protection Ltd.¹¹ Choosing to display jars of nondescript powders, adorned with written stickers and Dyno-typed labels, instead of potentially familiar branded packages, places these chemicals in a laboratory setting, foregrounds their invention, not their widespread use. Found in a section of the *Making the Modern World* gallery entitled “The Age of Ambivalence” the printed text interpreting this display of agricultural chemicals as “Chemicals in Food” conveys an ambivalent attitude towards this group of chemicals by what is included and what is omitted. A reference in the accompanying text to Rachel Carson’s *Silent Spring* acts as shorthand for environmental awareness. The text linked (unspecified) organophosphate insecticides to Second World War research on nerve gas, which had the effect of emphasising the ambiguity associated with agrochemicals. Two kinds of users appear in this interpretation: the consumers who expect cheap, uniform and unblemished year-round produce and the intensive farmers who apply weedkiller to their crops to meet these demands. The fact that these same types of chemicals were used in homes, as well as on industrial-scale farms, was not mentioned.

The importance of paraquat is cemented by its presence in this display, but nothing explains why this chemical was chosen to represent herbicides. Paraquat is presented under the topic “Chemicals in Foods” but the way that this weedkiller was used (because it has not been used in Britain since 2007) meant that residues were not

⁹ Robert Bud, “Collecting for the Science Museum,” in *Science for the Nation: Perspectives on the History of the Science Museum* ed. Peter Morris (Basingstoke: Palgrave Macmillan, 2010), 252.

¹⁰ Peter Morris, “The Image of Chemistry Presented by the Science Museum, London, in the Twentieth Century: An International Perspective,” *HYLE* 12 (2006): 215-239.

¹¹ 02 September 2013, Science Museum, Exhibition Road, London SW7 7DD.

typically found on fruit or vegetables, nor in meat or milk.¹² There is clearly a disparity between the reality of chemical use and its place in the display, one that points to discomfort about chemicals but also to the compromises, chance and assumptions involved in assembling an exhibition.



Figure 2.1 Pesticides displayed in *Making the Modern World* under the heading “Chemicals in food”. Paraquat is in one of the two small jars in the front row, left (author’s photo 02 September 2013).

Traces of these processes might be captured in an object’s accession record, which can be filed with letters or memos revealing the collection process, research or object labels from other exhibitions the object has been part of. However, paraquat’s accession record only reveals that the sample on display was donated by Plant Protection Ltd in 1976.¹³ This date is explained by the fact that the chemistry gallery was updated in 1977, for which new objects were acquired.¹⁴ This means that before paraquat was exhibited in *Making the Modern World* it was part of a different display, which reminds us that the same objects can be part of various stories. Although the manufacturing company described paraquat as revolutionary and an economically important weedkiller, the chemical did not enter the chemical for this reason. Instead,

¹² World Health Organisation and Food and Agriculture Organisation of the United Nations, *Pesticide Residues in Food – 2004*, (Rome: WHO, 2005) 150.

¹³ Mimsy (catalogue) search at the Science Museum, accession number 1977-290.

¹⁴ Personal communication, Peter Morris, email 20 January 2016.

existing relationships between the Science Museum and the producer's parent company, Imperial Chemical Industries (ICI), meant that paraquat, rather than a weedkiller made by another manufacturer, was collected simply as a typical example.¹⁵ Unlike other weedkillers, paraquat had been classified by 1976 as a poison and there had been calls for the controversial chemical to be banned, although this is not noted on the object's acquisition record. In the "Age of Ambivalence" display, no hint of paraquat's poisonous nature is given, nor is information about the willing, competent and knowledgeable chemical user visible in the museum's interpretation of these chemicals.

In comparison to the Science Museum's display which concentrates on agricultural use, the Garden Museum in London presents pesticides in a domestic context. Figure 2.2. shows a homemade insecticide puffer, a tin of Corry's Slug Death and a triangular tin of Abol Weedkiller, and elsewhere a couple of commercial insecticide sprayers and an ICI garden chemicals brochure are on display. A closer look at the label on the "non-arsenical" weedkiller revealed that this was a liquid to be used in half-pint measures and was 58% phenols. Crude phenols were also constituents of disinfectants, which were a common means of suicide.

The distinctive shape of the Abol weedkiller tin, once common but now unusual, was not remarked on, nor was Abol's active ingredient. The fact that the tin's contents were poisonous suggests to me that the shape was not only for the potential to stack containers more tightly, but to signal to the user through touch and sight that they should take care. Text labels are constrained by word limits and expectations of visitor knowledge, but omissions, like the fact that weedkillers can kill more than plants, are common, especially when chemicals are displayed. Such omissions demonstrate sensitivity and responsibility towards the visitors, whilst allowing space for them to fill in the gaps with their own knowledge or questions, and to stimulate private thought or conversation among companions.

¹⁵ Personal communication, Peter Morris, email 27 September 2016.



Figure 2.2 Shelf of chemicals at the Garden Museum, Abol weedkiller on the left. (author's photo, 13 August 2013)

Moving onto the next case study and the subject of Chapter 5, photography is scientific, technical and social so straddles different museum genres. Most often displayed are cameras and photographs, while the middle step, processing photographs, is curiously absent. Even at the National Media Museum (NMeM) in Bradford where a large proportion of the collection came directly from Kodak, manufacturers of chemicals as well as cameras, the cameras are better represented than chemicals or users.¹⁶ I also visited a National Trust property in Liverpool known as The Hardmans' House, which belonged to a married couple, and business partners, Edward Chambré and Margaret Hardman (Figure 2.3).¹⁷ These professional photographers ran a portrait studio there and made it their home. The property is described as a 1950s time capsule, so only items that were in the house at that time are displayed. In this instance, the users are evident than in the other displays because the domesticity contributes to the sense that the Hardmans might appear at any moment.

¹⁶ 27 August 2014, NMeM, Bradford, West Yorkshire, BD1 1NQ.

¹⁷ 31 July 2014, The Hardmans' House, 59 Rodney St Liverpool L1 9ER.

The Hardmans' private darkroom, the Barnston room, was situated towards the back of the house, and its small, single window had a blackout blind. Their business darkroom was in the cellar, where the temperature was naturally constantly cool. In their permanent darkrooms, the Hardmans stored all their chemicals on wall-mounted shelves, in glass-fronted cabinets and on shelves under the processing sinks. Photographic chemicals did not encroach on other domestic spaces in this household. However, domestic items did get stored in their private darkroom: bottles of preserved fruit were lined up with photographic equipment that was kept beneath the Barnston room sinks. Bottles from British-based photographic chemical specialists Johnsons, as well as Kodak, were present on the shelves, in addition to those from local chemists such as Clay & Abraham on nearby Bold Street (where they purchased many of the lotions and medications stored in their medicine cabinets). Also, there was packaging from chemical companies who did not specialise in photographic supplies, such as A. Gallenkamp & Company. These names represent the variety of sources from which serious photographers could obtain their chemicals.



Figure 2.3 One of two darkrooms at the Hardmans' House. Chemicals are found around the room, here they surround the sink and fill the wall cabinet. (author's photo 31 July 2014)

Chemicals are most often displayed in museums as they would have been sold, rather than as they would have been used or stored at home. In recreating shops, museums show not only the products but also represent counter service. However, the retailers' guidance and scrutiny of their customers is far harder to demonstrate. One of the most arresting shop recreations is the pharmacy display at the Museum of Norwich, where packaged, branded healthcare products compete for attention with dried medicinal herbs and bottled chemicals.¹⁸ In contrast to the preservation of an entire property and its contents like the Hardmans' House, this exhibit was assembled by historically-minded pharmacist John Newstead, who published a refreshingly personal account that illuminates the processes behind developing an exhibition.¹⁹ Survival bias, chance and personal networks are highlighted in the account.²⁰ He has also explained his collecting policy, which as well as aiming to represent an era, took into account his limited budget. Newstead chose only to buy items that were "strictly pharmaceutical". Therefore, although photography was often an important component of a pharmacist's livelihood, photographic products and services are absent from the reconstruction.²¹ By excluding photographic chemicals, their users were also erased, because the exhibition's viewers would not be prompted to imagine them.

As a trained pharmacist, Newstead understood how to recognise and to deal with potentially unsafe chemicals. One obvious option was not to accept dangerous substances, leaving them for someone else to deal with. Another option was to safely dispose of the chemical somehow. For instance, rather than risk an accidental fire with white phosphorus on display or in storage, Newstead burned it in his vegetable garden, resulting in "a bumper crop of potatoes" rather than a catastrophe.²² Solid phosphorus would not have ordinarily been sold and used as a fertiliser, but it was a creative use from this particular gardener.

¹⁸ 01 September 2015, Museum of Norwich, Norwich NR1 3JQ.

¹⁹ John Newstead, *A Pharmacist's Tale* (Wymondham: John Nicholls Publications, 2003).

²⁰ *Ibid.*, 30-34, 84.

²¹ *Ibid.*, 18, 21.

²² *Ibid.*, 34-35.

An understanding that chemicals are potentially dangerous has shaped how other museums have collected chemicals. Conservation officers, documentation assistants and curators are usually confident when handling unfamiliar and unusual objects as they assess, photograph, describe, store and display them. However, unfamiliar chemicals, especially unidentified powders, make non-chemists nervous, even when they take the normal precautions of wearing gloves to handle objects.²³ The lack of expertise and access to affordable, reliable specialist advice or analytical equipment means that all chemicals are viewed as risky. When collecting chemical products, museums tend to dispose of the contents, retaining only the packaging. Their potential to be harmful if handled incorrectly, to react in unexpected ways, or to off-gas in display cases and affect other objects, the difficulty of disposing or storing them, often renders the collection of chemical products an unattractive proposition. Fortunately, aside from the material culture that provides indirect evidence of practices, there is a wealth of complementary documentary sources that directly describe practices to which I will turn to now, beginning with an examination of instructional manuals.

Manuals

A plethora of manuals and guides have been published to instruct, update and reassure housewives, gardeners and home processors. These three distinct sets of advice literature have neither been systematically surveyed nor used as source material by historians. Dena Attar has reviewed the content and utility of domestic advice manuals,²⁴ and Grace Lees-Maffei has comprehensively discussed the limitations of advice manuals as sources. Although she has focused on domestic advice, her remarks are also relevant to gardening and photography. Most importantly, the advice given in publications was not necessarily followed in practice, but was only what was thought of as ideal, a point was also made by Attar.²⁵ Although the existence of such publications

²³ personal experience working in curatorial positions 2009-2012.

²⁴ Dena Attar, *A Bibliography of Household Books Published in Britain, 1800-1914* (London: Prospect Books, 1987).

²⁵ *Ibid.*, 18-19.; Grace Lees Maffei, *Design at Home: Domestic Advice Books in Britain and the USA since 1945* (Abingdon: Routledge, 2013), 2, 52, 71.

throughout the 1930s to the 1980s indicates a certain level of demand for ready-reference advice, it is impossible to truly gauge these publications' utility. Almost pristine reference copies in legal deposit libraries yield no clues. The second-hand copies located during my research include ex-library stock, so the date stamps show that they were checked out once or twice a year, with no discernible seasonal pattern, and their users were too careful to mark the pages, and too polite to write in the margins. Therefore, for the purposes of this thesis, manuals provide evidence that certain chemicals were recommended for use, that some were also known as poisons or antidotes, and that advice about which chemicals to use changed. However, because the manuals also advised their readers how to handle the potentially dangerous substance, these sources have also shown that, just because a useful chemical was also a poison, or was more harmful than previously believed, it was not ruled out from being recommended for domestic tasks.

In addition to manuals about general domestic management, single issue books were promoted to housewives, such as *Stay Alive!* published in 1967 and about accident prevention.²⁶ This publication claimed that until then, advice about home safety had either not been given enough prominence, or had imparted dull, impractical, restrictive and unrealistic information about accident prevention. The book proclaimed that it would break the silence about home accidents, which considering that domestic accidents were consistently being reported in newspapers was an overstatement. However, *Stay Alive* drew attention to the fact that although industrial and public transport accidents were systematically investigated and acted on in a practical manner, the same could not be said for accidents at home. There were no similarly targeted publications with the aim of reducing accidents in the garden or home darkroom.

For this thesis, I used a selection of manuals and guides that were published between the 1930s and the 1980s to research the information available to users about using chemicals for domestic tasks and hobbies. I chose books and pamphlets with the intention to capture changes across time, so if multiple editions were published, I accessed as many editions as possible. I paid attention to the identity of information

²⁶ Elizabeth Gundrey and Jean Carper, *Stay Alive: How to Avoid Accidents in the Home* (London: MacGibbon & Kee, 1967).

producers, and included publications from chemical manufacturers as well as those by independent authors. In order to find out whether the misuses, or feared misuses, of chemicals had affected the availability of chemicals for domestic users, I noted any remarks on how readily a chemical could be obtained, whether it was dangerous, required precautions or should be avoided altogether, along with any brand names and references to “proprietary products”.

Newspapers and magazines

Information about the uses of chemicals in the home was not confined to manuals, as advice was also printed in newspapers and magazines. Nor was it just broadcast and passively viewed. Readers wrote in to confirm, correct and share information, which indicates what users actually did in their homes, what chemicals were used and demonstrates that advice was critically, rather than unquestioningly, received. However, as Adrian Bingham has warned, published letters might have been edited or even invented.²⁷

The information, opinion and advertisements in newspapers can help to shape personal practices and attitudes towards chemicals.²⁸ Researcher Leon Sigal cautioned “news is not what happened, but what someone essays [sic: writes] has happened”.²⁹ Likewise, journalist Carlin Romano scoffed at the persistent idea of “news as a mirror”, and laid out the practicalities behind what appeared in the papers: the journalist’s contacts, geography, deadlines, what sells, what editors feel like that day, what had always been covered before.³⁰ It is important to bear these bluntly-made points in mind, but not to let them stand as a barrier against using newspapers at all. Bingham has stressed that newspapers have been underused by historians of the twentieth century, and points out that when they have been used, elite newspapers such as *The Times* have

²⁷ Adrian Bingham, *Family Newspapers? Sex, Private Life and the British Popular Press 1918-78* (Oxford: Oxford University Press, 2009), 9.

²⁸ Åsa Boholm, “Comparative Studies of Risk Perception: A Review of Twenty Years of Research,” *Journal of Risk Research* 1 (1998): 145-146.

²⁹ Leon Sigal, “Sources Make the News,” in *Reading the News*, ed. Robert Manoff and Michael Schudson (New York: Pantheon, 1986), 12.

³⁰ Carlin Romano, “What? The Grisly Truth About Bare Facts,” in *Reading the News*, ed. Robert Manoff and Michael Schudson (New York: Pantheon, 1986), 39.

often stood in for newspapers in general.³¹ As more newspaper archives are digitised and are therefore more easily searchable, this partiality is becoming less likely. In researching this thesis, I therefore accessed stories and adverts from a variety of digitised newspapers, including *The Times*, the *Guardian and Observer*, *Daily Mail*, *Daily Express* and the smaller local papers available through the British Library's (BL) online British newspaper archive. One disadvantage of the BL's regional newspaper database is that it currently ends in the early 1950s, whereas the content covering the period up to the 1980s is available from *The Times* and the *Guardian and Observer*.

References to chemicals appeared throughout newspapers: in advertisements, in financial news, agricultural and gardening columns, women's sections on housework and cosmetics, in children's sections that covered hobbies, as well as in accounts of events. One such type of report is the accident story. Ryan Viera has looked at the way accidents were reported in the 1820s, a period chosen because it is when modern risk society is considered to have emerged in response to industrialisation.³² At this time, domestic accidents involving chemicals were not newsworthy, whereas violent accidents involving modes of transport, fire and guns were. Viera has also made another important point, that although accident prevention was gaining currency in Britain, accidents were not reported as if they were preventable, predictable, or as if anyone was liable. Instead they focused on emotive personal details and social descriptions. My research has shown that by the 1930s, domestic accidents regularly made the news and that newspapers were still more concerned with personal and social details.

In addition to accidents, crime reporting captivated twentieth-century readers. Poisoning, acid attacks and explosions all involved chemicals, victims and perpetrators, and their inherent human interest made them newsworthy. Tunstall has highlighted that, in 1968, crime reporting was classified as having a potential audience by the papers, and that crime journalism grew accordingly. In concert with this growth, pressure groups and the police developed their public relations efforts so that their

³¹ Adrian Bingham, "Ignoring the first draft of history?" *Media History*, 18 (2012): 311-326.

³² Ryan Vieira, "Rethinking the History of the Risk Society: Accident Reporting, the Social Order and the London Daily Press, 1800-30," Chapter 3 in *Governing Risks in Modern Britain* ed. Crook and Esbester, 61.

messages would be picked up more successfully by the reporters.³³ Tunstall did not include chemical companies in his list of those who were keen to exploit the relationship between the media and public relations officers.

Like newspapers and books, magazines both shape and reflect practices and attitudes in the particular area that they are devoted to. I looked for relevant articles, letters and adverts in *Good Housekeeping*, *Practical Gardening* and *Amateur Photographer*. Not every issue for every year was examined, but a sample of issues from between 12 to 6 months of every 5-year period, which depended on the availability of library holdings. This approach was justified by the fact that magazine content remained remarkably consistent between the 1930s and the 1980s. This stability has been demonstrated in Dave Kenyon's study of the weekly magazine *Amateur Photographer*, in which he classified the feature articles as consumer information, techniques, individuals' working methods and their results (all of which could relate to chemicals), in addition to a high density of advertising.³⁴ Gardening and even housekeeping magazines also followed similar formats, relying on many of the same categories of topics (methods, products, other peoples' results) as well as advertisements throughout the 1930s to the 1980s.

Advertisements

Advertisements placed in newspapers and magazines provide insights into products that were available, at whom they were targeted and how products were expected to be used. The inclusion or absence of advertisements from newspapers and magazines indicates a particular income stream for that publication. However, during the 1940s paper supply came under paper control orders and publications were limited in their paper consumption, which meant that the space available for all for all types of newspaper and magazine content was restricted, with reduced scope for advertising.³⁵ The lucrative income from advertising in print media could occasionally affect the rest of

³³ Jeremy Tunstall, *Newspaper Power: The New National Press in Britain* (Oxford: Oxford University Press, 1996), 157.

³⁴ Dave Kenyon, *Inside Amateur Photography* (London: Batsford, 1992), 65-66.

³⁵ Bingham, *Family Newspapers*, 24.

the magazine's content, if for example an advertiser demanded particular conditions.³⁶ However, by the 1970s, only between a third to one quarter of a magazine's total revenue was from advertising.³⁷ The decreased proportion of income does not necessarily indicate a reduction in the number of adverts, but rather a reduced reliance on advertising, which meant that publications could potentially be more critical of products or companies.

Bingham has claimed that adverts inhibited scrutiny of advertised products,³⁸ but Martens and Scott found that *Good Housekeeping Magazine* expressed concerns about the safety of Vapona flykiller strips while continuing to advertise them.³⁹ If magazines and newspapers were persistently critical of industries' practices or products, manufacturers could choose not to advertise in publications that they perceived as "anti-business".⁴⁰ However, the precise role of advertising revenue and the power relationships between the advertiser and the publications used as sources in this thesis has been hard to establish.

Adverts cannot tell us how successful they were at convincing people to use the product; similarly to advice manuals, they are prescriptive, rather than portrayals of real situations. Nevertheless, these depictions or presentations of idealised use could contribute to viewers' ideas about chemicals and their place in the home, simply by being entertaining, informative or memorable. As Bruce Brown found in his survey of images of American family life in magazines, adverts reflected and reinforced values rather than shaped reality.⁴¹ Advertisers persuaded consumers that choosing between many products made them experts.⁴² Advertisements are therefore suitable sources

³⁶ Janice Winship, *Inside Women's Magazines* (London: Pandora, 1987), 40.

³⁷ Bingham, *Family Newspapers*, 23.

³⁸ *Ibid*, 23-24.

³⁹ Vapona was a dichlorvos-based insecticide made by Shell, which raised questions about the process of pesticide approval because of concerns about mutagenicity and the relevance of ingestion studies compared to the immediate and long-term effects of inhalation. Jon Tinker, "The Vapona Dossier," *New Scientist*, 02 March 1972, 489-492; P. Daniel, *Toxic Drift: Pesticides and Health in the Post-World War II South* (Baton Rouge: LSU Press, 2007), 152-157; Martens and Scott, *The Unbearable Lightness of Cleaning*, 394.

⁴⁰ Bingham, *Family Newspapers*, 23.

⁴¹ Bruce Brown, *Images of Family Life in Magazine Advertising 1920 - 1978* (New York: Praeger Publishers, 1981), 13.

⁴² Betty Friedan, "The Sexual Sell (1963)" Chapter 3 in *The Consumer Society Reader*, ed. Juliet Schor and

that can provide pieces of the story about how and why chemicals were used in the home.

However, advertising in newspapers and magazines has been targeted at adults, which leaves out the younger home processors in my user group of photographers. Relying on advertising is a way in which users can become erased, because even though the promotional material depicts the imagined ideal users it cannot show the true range. Historian Gary Cross pointed out that advertising directed at children was very limited until the 1950s.⁴³ In fact, advertising to non-adults was completely absent in the photography magazines I sampled. The rest of the chemicals studied in this thesis were categorically not to be used by children, although children were sometimes depicted in adverts in order to communicate meanings of domesticity, ease and safety.

Marten and Scott's survey of advertisements for cleaning products placed in *Good Housekeeping* magazine illustrates changes in societal values. They have found a decline in the number and frequency of cleaning product adverts, which they associated with women's growing independence, and rejection of the all-consuming role of the housewife in recognition of paid employment and pursuing interests beyond their homes.⁴⁴ In the sample of *Good Housekeeping* magazines examined for this thesis, the same reduction in advertisements for cleaning products was observed, but it is worth noting that housewives' lack of enthusiasm for housework was acknowledged by those companies who did advertise. For instance, in 1970 an advert for Goddard's Long Term silver polish used the tagline "You have better things to do than polish silver". Although speed and time had long been the subject of Goddard's advertising, the 1970 advert was a departure from the usual format of breezy advertising copy juxtaposed with an image of an eager young housewife, because the advert showed a bored older woman and the tone of the written text was decidedly sarcastic.⁴⁵

Douglas Holt (New York: The New Press, 2011), 33.

⁴³ Gary Cross, "Valves of Adult Desire: The Regulation and Incitement of Children's Consumption," in *Childhood and Consumer Culture*, ed. David Buckingham and Vebjorg Tingstad (Basingstoke: Palgrave Macmillan Ltd, 2010), 17.

⁴⁴ Lydia Martens and Sue Scott, "Under the Kitchen Surface: Domestic Products and Conflicting Constructions of Home," *Home Cultures* 3 (2006): 39-62.

⁴⁵ "You Have Better Things to Do Than Polish Silver," *Good Housekeeping*, February 1970, 105.

For adverts to convince people to become product users, they had to depict situations that their audience could imagine themselves in.⁴⁶ Therefore, advertisements not only tried to portray the product's ideal users, but were also designed for the papers they would be placed in. For instance, Tunstall described the advertisements in tabloid papers as "look-at" material, with pictures and big headlines, similar to the short articles which formed the rest of the paper. For tabloids, most income was generated through their large readership, so advertisements formed a lower percentage of revenue than for broadsheets. Elite papers such as *The Times*, bought by a far smaller audience, therefore relied more heavily on advertisements, which were tailored for the upmarket reader.⁴⁷ Nevertheless, as Blaszczyk has noted, advertising does not measure the success of the product, or what users did with it.⁴⁸

Glimpses of real users

A wealth of information about users did with chemicals is revealed in files from the Department of Prices and Consumer Protection, Home Office, and Ministry of Agriculture, Fisheries and Food (MAFF), which are now held at The National Archives, Kew. These files were assembled to research and track, for instance, the misuses of paraquat or solvents, and to gauge opinion and plan strategies to control those misuses.⁴⁹ The folders bulged with internal reports, case notes from medical journals, press clippings that reported accidents, and letters from parents of deceased children. Some of these files also contained copies of coroners' reports which contained statements given by other members of the household, and were a resource that would have been otherwise inaccessible as inquests are usually closed for 75 years. Additionally, many coroners' records have been destroyed.⁵⁰

⁴⁶ Brown, *Images of Family Life*, 13.

⁴⁷ Tunstall, *Newspaper Power*, 11-12.

⁴⁸ National Wholesale Grocers' Association, "Why Chain Stores Threaten the Nation's Welfare, 1930," in *Major Problems in American Business History*, ed. Regina Lee Blaszczyk and Philip B. Scranton (Boston: Houghton Mifflin Company, 2006), 314.

⁴⁹ For example: JF 1/6 *Toxicity, Solvent Sniffing*, Department of Prices and Consumer Protection; HO 305/32 *Control of Paraquat*, Home Office.

⁵⁰ <http://blog.nationalarchives.gov.uk/blog/coroners-inquest-records/> (accessed 03 March 2016).

Another perspective on users was obtained through sales ledgers. Although they recorded what was bought by each customer, how often, the cost and how the balance was paid, ledgers cannot tell us how or why chemicals or products were used at home, or about user preferences. For instance, although Fitzhugh and Carr's sales ledger shows that they regularly sold Thawpit, the carbon tetrachloride (CT) based grease remover that will be studied in Chapter 3, the ledger did not reveal any sales of unbranded CT.⁵¹ As well as the archival documents, the shop fittings and contents of Fitzhugh and Carr were available for inspection because they were donated to the Brewhouse Yard museum. However, the questions raised by the ledgers remained unanswered, because neither form of CT was visible at the museum. The only way to answer those queries would be to have users explain their choices themselves.

Users in their own words

Several approaches were taken to access users' own words: archived diaries and published memoirs, as well as in existing oral history recordings were sought. Diaries and other material generated by Mass Observation (M-O) participants during the Second World War and beyond have formed the basis of edited works, but these proved to be a poor source of information on chemicals in the home.⁵² A directive that specifically asked about housework prompted M-O respondents to record the time spent on activities, so the majority of replies provided this information, but scant details on the chemicals or products used.⁵³ Brief and partial responses to directives were typical: Jayne Raisborough and Mark Bhatti also found this when they used the archive to research gardening.⁵⁴ The raw M-O responses available at The Keep, Brighton, were time consuming to read and ultimately yielded very little detail on buying, using or

⁵¹ Fitzhugh and Carr, "DD687/81 Sales Ledger," Nottingham Local Archive, n.d.

⁵² Nella Last (ed. Patricia Malcomson and Robert Malcomson), *Nella Last's Peace: The Post-War Diaries of Housewife*, 49. (London: Profile Books, 2008); Joan Strange (ed. Chris McCooey), *Despatches from the Home Front: The War Diaries of Joan Strange 1939 - 1945* (Eastbourne: Monarch, 1989); Constance Miles, *Mrs Miles' Diary: The Wartime Journal of a Housewife on the Home Front* (London: Simon & Schuster, 2013); Mary Morris (ed. Carol Acton), *A Very Private Diary* (London: Weidenfeld & Nicolson, 2015); David Kynaston, *Family Britain 1951-1957* volume 2 (London: Bloomsbury, 2010).

⁵³ SxMOA2/1/13/1/3, The Keep.

⁵⁴ Jayne Raisborough and Mark Bhatti, "Women's Leisure and Auto/Biography: Empowerment and Resistance in the Garden," *Journal of Leisure Research* 39 (2007): 465.

thinking about domestically used chemicals.

Users have been more likely, but not guaranteed, to talk about chemicals when they have been asked directly, such as for market research or as part of oral history interviews. Contacting manufacturing companies for old market research proved fruitless, even for companies such as Unilever and Boots who used market research and who now maintain heritage archives. However, M-O monetised their interviewing and observing skills by setting up a market research company, so there are also some of these records archived at The Keep. Their report on laundry revealed that users parroted advertising material when they explained why they used particular products.⁵⁵ Moreover, market researchers who had interviewed users of a new cleaner found it very hard to draw out any relevant comments from a very disengaged sample of users.⁵⁶ Housewives were more forthcoming for a report on Thawpitt, prepared by advertising agency J. Walter Thompson (JWT) and is now archived at the History of Advertising Trust in Raveningham, Norfolk. Researchers asked housewives about how they removed grease spots and their responses covered a wide range of branded products, chemicals and domestic methods.⁵⁷ These reports, as well as correspondence between clients and agencies, proved to be a valuable resource, especially for the case studies in Chapter 3. One market research report on the herbicide Weedol that had been carried out by Plant Protection was available because it had been filed by MAFF,⁵⁸ but this type of information is lacking from my chapter on photography.

Another source of users' own words about their experiences of using chemicals is found in oral histories. Oral histories are an opportunity to access everyday experiences that do not otherwise get recorded.⁵⁹ The British Library has invested in collecting, processing, storing and making available a great number of oral history recordings, many of them in organised thematic sets. Their catalogued transcripts and notes make them

⁵⁵ "A16 Clothes Washing - Motives and Methods," 1939, SxMOA1/1/4/4/1, The Keep.

⁵⁶ "Liquid Scourer Survey," 1960, Mass Observation, SxMOOA1/2/78/5/A/1, The Keep.

⁵⁷ British Market Research Bureau, "Thawpitt Consumer Investigation, 1945," HAT 50/1/175/3.

⁵⁸ Bureau of Commercial Research Ltd, "Report of a Placement Test for Weedol Weedkiller, October 1964," MAF 284/307, TNA.

⁵⁹ Paul Thompson, "The voice of the past," in *The Oral History Reader*, ed. Robert Perks and Alistair Thomson (New York: Routledge, 2006), 21-26.

searchable. For this thesis, I accessed oral history recordings from a variety of projects: Oral Histories of British Photography because the photographers developed and printed their own work; and, Oral History of Community Pharmacy in the expectation that pharmacists might talk about selling chemicals other than medicines. The use of chemicals at home also cropped up in the recordings for National Life Stories – Craft Lives, although not, as I initially assumed, because artisans used chemicals in the craft processes, but because some gave detailed descriptions of their home lives.⁶⁰ Participants in An Oral History of British Science were likely to relay anecdotes about buying chemicals for their childhood chemistry sets⁶¹ or that they processed their own photographs,⁶² but did not mention domestic housework at all.

Existing oral history recordings are time consuming to interrogate and listen to, but using the BL collections provided access to users active in the 1930s, who were established professionals in the 1940s and 1950s, some of whom are now dead, while others are too impaired by bad health to share their memories. In fact, the time spanned by the collections was perfect for this thesis and I have been able to utilise a resource that very few others have.⁶³ Using the BL's oral history collections was important, because my efforts to arrange my own oral history interviews often failed, either for lack of response at all, or for logistical reasons. I was able to conduct two interviews, both with photographers: Paul Carter, who had previously been interviewed by the BL, the other with Dave Butcher, and an anonymised, informal discussion with a photographer who began developing photos in the 1980s and is referred to as PU80.

Whether in diaries or interviews, the narrator is invested in shaping how they will be remembered generally, not just as a chemical user, and this affects the information they share. Additionally, the influence of the oral history interviewer, during the many hours-long life stories recorded over several sessions, can be seen when the interviewer directs the dialogue with questions fitting their own agenda and interests, which are

⁶⁰ Joan Pilsbury, "National Life Stories Collection: Craft Lives," interview by Frances Cornford (01-02 November 2012).

⁶¹ Anthony Kelly, "An Oral History of British Science," interview by Thomas Lean (29 July 2011), 25.25, 56.43.

⁶² Frank Land, "An Oral History of British Science," interview by Thomas Lean (21 June 2010), 28.16.

⁶³ Based on searching for citations of the recordings.

inevitably different from those of a future researcher. This problem highlights why existing oral history recordings are underused: the listener must accept the content of the interview. For example, Joyce Butler's interviewer concentrated on what it was like to be a woman in politics between the 1950s and the 1970s. Butler was the originator of the Farm and Garden Chemicals Act (1967) which called for clearer labelling to empower users.⁶⁴ She was so personally committed to the issues she campaigned for that, having called for a ban on chlorofluorocarbons (CFCs), she publically pledged to stop using aerosol hairspray until the ingredients were properly listed.⁶⁵ However, she was not asked about any of these activities in her oral history interview, the focus of which was explained by its inclusion in a project by the Fawcett Society, which focused on women who worked in male-dominated fields.⁶⁶ Likewise, searching the Oral History of Community Pharmacy project led by Stuart Anderson, was shaped by his interests in health, medicine and prescriptions.⁶⁷ Anderson's tightly scripted questions have meant that barely any of the interviews could draw out reminiscences about selling non-medicinal chemicals.

On a more positive note, an aspect that comes across particularly well in oral histories and biographies is the sensuality associated with using chemicals. Sensory ethnography is a method used with great success by anthropologist Sarah Pink,⁶⁸ and is especially relevant to the practices studied in this thesis. When examining chemicals in the home from the 1930s to the 1980s, sensory aspects cannot be accessed directly. Instead, a host of sources including photographs, adverts, instructions, news reports, official discussions, published advice, personal diaries and recollections, can be closely read in order to piece together what it was like to use chemicals in the home. This approach has been successfully used by Katherine Watson in order to communicate the realities of poison as an agonising, rather than swift or silent death.⁶⁹

⁶⁴ Joyce Butler et al., "Farm and Garden Chemicals," HC Deb *Hansard* (20 July 1971): vol 821 cc1295-407.

⁶⁵ "Feedback: MP Calls for British Fluorocarbon Ban," *New Scientist*, 07 August 1975, 336.

⁶⁶ Joyce Butler, "NLSC: Fawcett Collection," interview by Marie Maynard, British Library (1991).

⁶⁷ Stuart Anderson, C816 *Oral history of community pharmacy*, British Library.

⁶⁸ Sarah Pink, "Dirty Laundry: Everyday Practice, Sensory Engagement and the Constitution of Identity," *Social Anthropology* 13 (2005): 275-290.

⁶⁹ Katherine Watson, *Poisoned Lives: English Poisoners and Their Victims* (London: Hambledon and London, 2004).

Accessing M-O and oral history primary sources reassured me that diary editors and other authors had not excluded remarks about the purchase or use of chemicals, that instead, chemicals were simply not mentioned in the first place. Although contributors to the M-O project appeared to be motivated to provide useful data for anthropologists and future historians, respondents did not write about chemicals. Even when users were directly questioned about activities that were likely to have involved using chemicals, it was not guaranteed that they would name or describe them in any detail. This archival absence of users' factual or reflective comments about their use or non-use of chemicals corroborates the complaint made by Cowan and numerous other researchers that ordinary domestic practices are under researched.⁷⁰ So, why write a thesis on domestic chemicals which people do not say they care about? I argue that the absence of chemicals from the aforementioned archival documents and oral histories is striking and intriguing, because although people mentioned doing tasks that would have involved chemicals, they did not see chemicals as worth commenting on or naming at all. Their responses did not reveal resentment towards chemical industries or rejection of its products, but neither did praise for convenient household chemicals flow freely. I did not find expressions of dread or concern for the consequences of using chemicals, or conversely, not using them. This finding supports my concern that environmental histories have been driven by influential but tiny minorities, because if chemicals had concerned other diarists or interviewees, they would have commented on them.

Having described the approaches taken to sources, I move on to the case studies themselves. These are organised according to user groups, and therefore domestic locations: housewives cleaned and removed stains throughout the home, gardeners prepared their chemicals in the shed, garage or utility room, then applied herbicides to weeds outside, while home photographic processors usually worked with their chemical solutions, films and prints in a darkroom. Chapter 3 looks at some of the chemicals used for household cleaning between the 1930s and the 1980s.

⁷⁰ Ruth Schwartz Cowan, "The 'Industrial Revolution' in the Home: Household Technology and Social Change in the 20th Century," *Technology and Culture* 17 (1976): 1; Martens and Scott, "The Unbearable Lightness of Cleaning," 380; Ina Zweiniger-Bargielowska, *Austerity in Britain: Rationing, Controls, and Consumption, 1939-1955* (Oxford: Oxford University Press, 2000), 101.

Chapter 3: Housework

Between the 1930s and 1980s, housewives were able to choose from an ever-changing array of branded cleaning products, but they also used unbranded chemicals too. In this chapter, I have assembled two case studies: washing soda, also known as soda crystals or sodium carbonate, and carbon tetrachloride (CT). To supplement these chemicals, I have included the branded products Carbosil and Thawpit. Carbosil was an alternative to plain soda and disappeared from the market in the 1940s. Thawpit was based on CT and marketed as a grease remover, one among many other solvents and methods. Soda remained available throughout the 1930s to the 1980s, but CT, and by extension products which were based on it, came under scrutiny for their potential harmfulness to users in the late 1960s, and was implicated in damage to the ozone layer in the 1980s. Both factors led to CT's gradual replacement with other solvents. I draw on household manuals, biographical accounts and reminiscences, advertisements and articles in newspapers and magazines, as well as material retained in the J. Walter Thompson (JWT) archive at the History of Advertising Trust, because JWT promoted Thawpit. Considered together, the sources allow me to create a richer picture of how these chemicals were used than any isolated source alone would.

I chose to examine soda because household advice publications so often recommended "soda" for general housework. Often they did so without specifying any further details about which soda, from where it might be obtained or what qualities to look for, suggesting that such information was commonplace and obvious to users. Another reason for my choice of soda was that, although the manufacture and sale of soda has formed a substantial part of histories of chemical companies such as Imperial Chemical Industries (ICI), Lever Bros, and Joseph Crosfield & Sons, their uses in the home have been largely overlooked.¹ Domestic soda users have only been visible as silent, characterless aggregates who either

¹ A.E. Musson, *Enterprise in Soap and Chemicals: Joseph Crosfield & Sons Limited 1815 -1965* (Manchester: University of Manchester, 1965); William Reader, *Fifty Years of Unilever, 1930-1980* (London: Heinemann, 1980); William Reader, *Imperial Chemical Industries: A History* (London: Heinemann, 1970).

bought or did not, so appear in these histories only in connection with potential income generation. Soda has also been mentioned in social histories that included descriptions of housework, but attention has tended to focus on pre-1930s practices.² Therefore, the lack of research on this topic post-1930s provided me with an opportunity to look at the changing availability and roles of this chemical between the 1930s and the 1980s.

Although clothes laundering has been well researched for this time period, spot cleaning has not. Used for removing marks from non-washable or delicate items, for washable items it is also a way of postponing the need for a full launder, and therefore saves labour. Glen O'Hara has pointed out that in Britain, the expense and the electricity and plumbing infrastructure required for their operation meant that in 1961 only 41.3% of households had washing machines. By 1978 however, washing machines were found in 72.9% of households.³ The process of boiling laundry had linked high temperatures with cleanliness, but the synthetic detergents marketed from the 1950s did not require this process. Ruth Schwartz Cowan and others have argued that improvements in washing machines and access to them did not necessarily reduce the total amount of housework, but instead caused whole garment laundering to be done more often.⁴ Better washing machines and increasingly complex and effective detergents changed the operator's involvement in stain removal from spot treatment, to first aid before laundering. Nevertheless, the fact that stain removal advice was updated to accommodate the arrival of new textiles indicates that there was still a role for domestic expertise in this area. Spot cleaning techniques and chemicals are also relevant to cleaning furnishings that cannot be laundered, a topic that has been overlooked by other historians. Additionally, stain removal prolonged the life of furnishings and garments, whether they had been expensive, precious, or simply had to be made to last when clothing or money was scarce. CT was frequently recommended for removing greasy marks

² Maud Pember Reeves, *Round About a Pound a Week* (New York: Garland Pub, 1980).

³ Glen O'Hara, *The Politics of Water in Post-War Britain* (Basingstoke: Palgrave Macmillan, 2017) Chapter 7 "Hot and Cold Running Controversy: Water, women and the politics of washing".

⁴ Ruth Schwartz Cowan, *More Work for Mother: The Ironies of Household Technology from the Open Hearth to the Microwave* (New York: Basic Books, 1983).

in the 1930s, but by the 1960s and 1970s housewives were advised to avoid it altogether by some sources, but not all. This change over time, as well as the fact that there were good archival holdings for Thawpitt at the History of Advertising Trust (HAT), made the chemical an interesting candidate for a case study. Additionally, this chemical had different uses, users and misuses in the home, so Chapters 5 and 6 will revisit and extend the case study.

The general reasons for using domestic advice manuals, newspapers and magazines were explained in Chapter 2, but here I want to consider the information those sources provided about domestically used chemicals. The dissemination of practical instruction about how to obtain and use chemicals was an important step in the evolution of household cleaning. Domestic advice literature both created and reflected changes over time, but was only one aspect of how information and practices spread. People also learned from their families, and neighbours.⁵ Although some educationalists believing that teaching home economics in schools prevented students from learning other subjects, domestic science teachers hoped to provide real world explanations of scientific phenomena in their lessons and introduce methodical, logical work plans.⁶ Nevertheless, the associated textbooks are part of domestic advice literature which can be accessed at home independently of formal education. Home economics classrooms were essentially models of domestic kitchens, created to imprint the ideal objects and their uses into their students' minds. For instance, soda was stored and used in the kitchen (see Figure 3.1) as well as in "domestic science" experiments that demonstrated soda's water softening ability.⁷ The involvement of chemicals in stain removal made the task a scientific one, which involved experimenting on an inconspicuous area, and carefully handling potentially dangerous substances.

⁵ "A16 Clothes Washing – Motives and Methods," Mass Observation, 1939, 24.

⁶ Dena Attar, *Wasting Girls' Time: The History and Politics of Home Economics* (London: Virago, 1990), 49, 103-104.

⁷ BF 1/1/199 66/1866, BF 1/1/299 67/10534, Institute of Education Archives, London.

This figure had been removed due to copyright restrictions

Figure 3.1: A large jar of washing soda on the window sill in a home economics classroom, c.1960. (BF 1/1/19a 66/1877, © London Metropolitan Archives [accessed Institute of Education Archives])

Advice on stain removal

Stain removal advice was a constant feature of domestic advice literature. The often concise, practical instructions made the topic well-suited to filling in small gaps in newspaper layouts, and in the daily diaries published by women's magazines.⁸ This amenability to publishing constraints has meant that many stain removal methods acquired the dubious status of old wives' tales.⁹ Therefore, in longer and more serious articles or books about stain removal, the authors tended to state their experience or otherwise signal that their information is trustworthy. For instance, the scientific methods associated with a consumers' institute indicate that they have been systematically tried and tested, but others have called on years of experience as a lady's maid or valet, even as the mother of a rambunctious family, or the fact that as the daughter of a dry cleaner, one has therefore been exposed to efficient and effective practices.¹⁰ These references to science and

⁸ Kenneth Robinson, "Your Date with the Good Life," *TT*, 07 January 1988, 8.

⁹ Leslie Keating, *Stain Removal* (Havant: Kenneth Mason, 1972), 4.

¹⁰ Harry J. Beney, "A Vanishing Species: The Gentleman's Gentleman," *Vogue*, October 1953, 69, 114.; "Fashion: Out, Damned Spot! A Great Maid Tells the Secrets of Her Craft: Spots and Stains," *Vogue*, July 1967, 90, 125; Shirley Conran, "Without a Stain on Her," *The Observer*, 21 June 1970, 32.

industry embody the attempts of home economists to equate housework with professionalism and modernisation.¹¹

Logical workflows were promoted by home economists and the first steps of stain removal were to establish the type of fabric and what caused the stain, which determined the choice of stain remover. Housewives were expected to be able to identify the natural fibres, and to later develop a working understanding of an increasingly confusing variety of combinations of synthetic fibres and finishes.¹² As to the types of stains, until the 1940s these had been mainly limited to mud, soot, body fluids and wastes, grease, grass and fruit but this range was expanded by a barrage of processed foods and office materials, for instance carbon paper and mimeographic correction fluid, indelible pencils and a variety of inks.¹³

One of the changes to note in this advice was the rise of branded products. Branded products, as opposed to chemicals like soda or CT, had been described and recommended from before the 1930s, but vaguely, as unnamed “proprietary” or “commercial” products.¹⁴ On one hand, not naming products had advantages in that the information remained internationally relevant and it would not become dated if brands disappeared over time. On the other hand, a disadvantage of not recommending a brand name was that the housewife had to work harder to identify and obtain the correct product. Users would have had to discuss the properties they sought with the shop assistant, who would have been able to identify the product. By the 1970s and 1980s, when self-service shopping had become common, advice literature gave brand names readily.¹⁵

These shifts hint at changes in retail and in people’s geographic mobility, but also at how they reduced the effort spent on shopping and cleaning. Self-service

¹¹ Dena Attar, *Wasting Girls’ Time: The History and Politics of Home Economics* (London: Virago, 1990); Joel A. Tarr and Mark Tebeau, “Managing Danger in the Home Environment, 1900-1940,” *Journal of Social History* 29 (1996):799-800.

¹² James Lewis, “Sud Standard,” *TG*, 16 June 1973, 11.

¹³ Alma Chesnut Moore. *How to Clean Everything: An Encyclopedia of What to Use and How to Use It* (London: T Werner Laurie Ltd, 1954).

¹⁴ Margaret Sherman, “Don’t Cry over Spilt Ink,” *DM*, 1950, 6.

¹⁵ Cassandra Kent and Gillian Smedley, “Out, Damned Spot! GHI’s Guide to Stain Removal,” *Good Housekeeping Magazine*, September 1975,” 74-79.

shopping changed the relationship between customer and shop staff, as well as the knowledge that both were expected to have and exchange about products. Personally knowing buyers had been upheld as a main way that chemists and druggists could evaluate whether a buyer would responsibly use a potentially harmful chemical. Travelling for work, even getting a bicycle or car, enabled customers to buy chemicals from shops where they might not be known by the storekeeper, so recognisable and non-poisonous branded products would have made shopping easier. Nevertheless, the domestic use of chemicals which were potentially harmful meant that advice literature which included first aid instruction provided information about chemicals.

Advice on first aid

The first aid chapter of domestic advice books represented the dominant form of feared interaction with chemicals, that of acute and fatal poisoning through ingestion. In the context of first aid, chemicals were given the identity of poison or antidote.¹⁶ These were not true antidotes, but the administration of emetics or attempts to neutralise corrosives. However, the first aid chapters did not refer to why the poisons were present in the home, and with the exception of the corrosive chemicals used for stain removal and heavy cleaning, the poisons listed rarely corresponded to the domestic products mentioned elsewhere in the books. Therefore, such lists suggested that chemicals were used in the home for tasks other than housework. Gradually, the first aid treatments were simplified,¹⁷ which corresponded to the increased complexity of products and ignorance of their contents. By 1974 the British Red Cross and the St John Ambulance, who provided first aid training and literature, ceased to recommend so-called antidotes and purges because of the scope for confusion and causing greater harm.¹⁸ This change

¹⁶ Isabella Beeton, *Mrs. Beeton's Hints to Housewives; with Sections on Labour-Saving, Household Work, Servants' Duties, Shopping, Table Service, Etiquette, and First Aid* (1928); Jessie Marie De Both, *Modern Household Encyclopedia* (Chicago: J.G. Ferguson and Associates, 1946).

¹⁷ 'Reader's Digest' *Household Manual* (London: Reader's Digest Association, 1977), 399.

¹⁸ Andrew Raffle et al., "First-Aid Treatment of Poisoning," *BMJ* 1 (1976): 93.

was also related to the realisation that most household substances were not deadly.¹⁹

The preoccupation of chemical users and non-users with acute poisoning, rather than any uncertain, sub-lethal but toxic effects from long-term, low-level exposure to chemicals, dominated the period between the 1930s and the 1980s, and is therefore a theme that recurs throughout this thesis. An exception were the examples of borax and boracic acid as food preservatives, which were in the 1920s linked to cumulative ill effects on health when used as food preservatives, as well as instances of acute poisoning when used as medicine.²⁰ However, in the 1930s the removal of borax and boracic acid from food products, and the delivery of cautionary messages about its pharmaceutical use, did not appear to greatly affect its reputation as a multipurpose, inexpensive chemical used around the house. Borax continued to be recommended without warnings and the chemical remained available throughout the 1980s.²¹ In this situation, users appear to have associated the possibility of poisoning only with the medical and food preservative uses of borax, and therefore continued using the chemical for cleaning.

The fact that chemicals classed as poisons were used in the home was common knowledge and apparently accepted by domestic users. For example, in 1926 Ernest T. Neathercoat, a former president of the Pharmaceutical Society of Great Britain, expressed the view on domestically used chemicals that "If effective for the purposes for which they are sold, all of them are virulent poisons capable of causing an agonising death". The impetus for his commentary was the new Poisons Law, which was enacted that year and prevented chemists from selling poisons unless they were clearly labelled as such. Neathercoat welcomed the sentiment behind improved labelling, but worried about the "ignorance and carelessness" of domestic users, about the "despairing," and about "inquisitive children". His

¹⁹ Neil C. Fraser, "Accidental Poisoning Deaths in British Children 1958-77," *BMJ* 280 (1980): 1597.

²⁰ Sir William J. Pope, "Preservatives In Food" *TT*, 22 January 1925, 13.; W.E. Dixon, "Preservatives In Food" *TT*, 14 February 1925, 8; "Common Remedy Condemned," *TT*, 25 January 1928, 9.

²¹ "Spring Cleaning," *TT* 06 April 1938, 19; "Efficient Housekeeping," *TT*, 03 September 1940, 7; "Razor Blades," *TT*, 10 May 1944, 5; Joan Storey, *Running a Home: A Guide to Efficient Household Management* (London: Faber, 1968), 63.

concern lay chiefly with acids: carbolic, oxalic, hydrochloric (spirits of salts, or muriatic acid), sulphuric (vitriol) and nitric (aqua fortis).²² Except for expressing concern about the woman who wanted salts of lemon (potassium hydrogen oxalate, a near relative of oxalic acid) to flavour her cakes, Neathercoat did not elaborate on what exactly was being done in homes with these chemicals. Neither was he curious about why users chose to keep these potentially harmful chemicals in their possession, how they knew about them, or the variety of places where they could obtain them.

Instead, Neathercoat was more concerned with misusers. Neathercoat's categories of misusers – inquisitive children, and ignorant, careless and despairing users – could be identified throughout the period researched, so are fitting for this thesis and are further discussed in Chapter 6. Although acids were the subject of Neathercoat's concern, by the 1930s some domestic advice literature, such as the *Harpic Home Book*, already recommended avoiding these chemicals in favour of their own range of products.²³ Hence, as I wanted to study everyday, ordinary chemicals, I chose to research washing soda.

Sodas

Washing soda is part of a family of chemicals which includes some of the most innocuous and the most dangerous of chemicals used at home. Ranked in order of most to least harmful, these are caustic soda (sodium hydroxide), washing soda (sodium carbonate or soda crystals) and baking soda (sodium bicarbonate). All three chemicals are the result of the same industrial production method, based in part on innocuous, familiar substances: common salt and limestone. Misgivings about sodas of all kinds had regularly occupied the correspondence columns of newspapers in the 1890s, but gave way to an acceptance that washing soda and baking soda were not harmful.²⁴ The soda usually responsible for accidents, often involving inquisitive children, was caustic soda.

²² E.T. Neathercoat, "Poisons in the Home," *DM*, 02 January 1926, 6.

²³ *The Harpic Home Book* (London: Harpic Manufacturing Company 1928), 107.

²⁴ "Soda in the Kitchen," *Coventry Herald*, 11 September 1891, 2.

Caustic soda was used for domestic tasks more rarely than the gentler sodas, but as a strong alkali, it was also used for harm. For instance, it was used to vandalise a golf course,²⁵ and the corrosive chemical has been thrown, as vitriol, into the face of victims,²⁶ typically by a spurned lover attacking the object of their desire.²⁷ Caustic soda, which continues to be sold as either a liquid, or in solid white flakes or chips, is a strong alkali and can burn living tissue if it is not neutralised or rinsed off immediately. Although it burns in the mouth, in practice this sensation does not always lead to it being spat out. Instead, it can lead to a reflex swallow, and with dire consequences.²⁸ The risks of using caustic soda appear to have been well known and generally well heeded, because between the 1930s and the 1980s, reported accidents with caustic soda in the British home were rare, and declining in frequency. Caustic soda was responsible for seven deaths in children under 10 years old between 1931 and 1935, nearly two each year.²⁹ Later, there were so few deaths attributed to caustic soda that the chemical was grouped with cresol, phenol and unspecified acids as “corrosive”, which all together killed a total of 16 children between 1958 and 1977, an average of four deaths every five years.³⁰ Although the number of fatal cases decreased, non-fatal accidents involving caustic soda flakes continued to occur, yet were only reported sporadically in newspapers where they acted as cautionary tales.³¹ Nor did these invariably short news pieces elaborate on the users’ responsibility to properly store caustic soda or other household chemicals; the readers were expected to fill in such details themselves. The severe

²⁵ “‘Jews Keep out’ Sign on Links,” *Daily Express*, 11 July 1938, 1.

²⁶ “Woman Burned by Acid,” *MG*, 14 January 1949, 8.

²⁷ Katherine Watson, “Loss of Face – Vitriol Throwing in Nineteenth- and Twentieth-Century Britain,” paper delivered at Crime and Legal History Seminar, Oxford Brookes, 27 March 2013.

²⁸ J. Pearn, et al., “Accidental Poisoning in Childhood: Five Year Urban Population Study with 15 Year Analysis of Fatality,” *BMJ* 288 (1984): 44-46.

²⁹ J. O. Craig, “Emergencies in General Practice: Poisons Children Swallow,” *BMJ* 2 (1955): 1496-1498.

³⁰ Fraser, “Accidental Poisoning Deaths,” 1595-1598.

³¹ “Ten Calls for Ambulance: Bolton’s Bad Night,” *MG*, 04 August 1937.

consequences of caustic soda burns, permanent and painful damage to the mouth and oesophagus for instance,³² were never reported in the national daily press.

Another member of the soda family, is the harmless bicarbonate of soda, or baking soda (different from baking powder, which is a combination of bicarbonate of soda and potassium bitartrate [cream of tartar] to ensure an optimum acidity that aids leavening). Although advice in newspapers and household manuals promoted the cleaning properties of baking soda, British bicarbonate manufacturers did not push this message. In Britain, bicarbonate producers were invisible. When bicarbonate was marketed, for instance by Boots, it was described as “indispensable for medical and culinary purposes”, but they did not mention any household uses.³³ The long established social belief in Britain was that bicarbonate of soda was for medication and cooking, not housework. For example, the *CWS Household Hints* book advised that bicarbonate of soda should be used for cooking and that the chemical should be kept in a tightly covered jar, in a dry cupboard. Bicarbonate of soda ought to be purchased in small quantities, which meant that it was used up quickly, before it became stale or damp.³⁴ By contrast, in America, manufacturers Church & Dwight heavily promoted baking soda as a versatile domestic chemical through informative adverts and booklets dedicated to all its different household uses.³⁵

In the home, bicarbonate of soda was interchangeable with washing soda for small cleaning jobs, such as removing stains, softening water and cleaning surfaces. Substituting washing soda for baking soda was less common, although it could be ingested in small amounts without harm, it generally was not substituted deliberately for culinary uses.³⁶ In household manuals, the names were reliably

³² Fiona Ryan et al., “The Oral Implications of Caustic Soda Ingestion in Children,” *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiation and Endodontics* 101 (2006): 29-34.

³³ “At Home or Away Boots Helps You Save,” *Hartlepool Mail*, 14 August 1953.

³⁴ *C.W.S Household Hints* (Manchester: C.W.S. Publishing Limited, 1930s), 30.

³⁵ *It's All in Knowing How* (New York: Church & Dwight, 1935); *The Usefulness of Soda* (New York: Church & Dwight, 1952).

³⁶ *The Harpic Home Book*, 107; Philip Howard, “Camping as Life of Luxury with Inflatable Furniture and Ingenious Gadgets,” *TT*, 27 January 1972, 3, however, sodium carbonate is a constituent of the soaking tablet included with dried peas.

given for the caustic and baking soda, to avoid confusion, although for many other household activities the type of soda was unspecified, which assumed those undertaking the housework to know the different properties of the sodas and to recognise the contexts that demanded each type. Caustic soda was too strong and therefore inappropriate for anything but the dirtiest, greasiest cleaning tasks, while baking soda was reserved for culinary and cosmetic purposes, which this thesis is less concerned with. Hence I begin this chapter's case studies with the most commonly used soda: washing soda.

Washing soda and Carbosil

This section looks in more detail at the production and use of washing soda, and of a branded product, Carbosil, which was based on sodium carbonate and marketed as an alternative to washing soda. ICI sold plain sodium carbonate to domestic users via retailers including Boots the Chemist, as loose soda, or boxed in two pound amounts and branded with ICI's circular logo. There were other soda producers, such as Thawpit in High Wycombe, which as well as being a recognisable brand of household chemicals in their own right, also supplied Boots Chemists shops with loose, unbranded soda until the 1950s.³⁷ In the British home between the 1930s and 1950s, washing soda was a versatile workhorse for general cleaning, and a good water softener that prevented soap scum. Washing soda did not disappear from housewives' options, but as will be shown in this chapter, a combination of influences meant that it receded from first choice.

Before, and during the 1930s, washing soda was a basic necessity, which meant that other cleaning products could be positioned as something more than soda. Carbosil was one such example. This washing soda-like cleaning product was manufactured by soap makers Joseph Crosfields & Son from the 1890s until 1941. Such a lot of soda was required to process fats and oils into soaps that Crosfields manufactured their own soda. Carbosil was born of finding a profitable use for the large volumes of caustic soda (then converted to carbonate, washing soda) and waste silicate produced by Crosfields. The double salt of sodium carbonate and sodium silicate was successfully marketed by Crosfields as Carbosil.

³⁷ Letter from P. Davies, 08 January 1964, "Thawpit, ICI," Boots Archive.

Table 3.1: Domestic uses and misuses of sodas. See endnotes for references.

Date	Sodas		
	Caustic	Washing	Bicarbonate
1890s			Medicine cabinet: to relieve indigestion, sunburn, stings
1920s		Make Javelle water, a disinfectant ⁱ Clean and stiffen household brushes, clean range and gas cooker ⁱⁱ	
1930s	Kill tree stumps, even oak ⁱⁱⁱ	Kill weeds - applied dry ^{iv} Treat plant disease, such as rust (mixed with copper sulphate) ^v	Douche - Influence conception: have a boy ^{vi}
	Remove old paint from furniture ^{vii}	Wash bedsteads with soda solution to combat bed-bug infestation ^{viii}	Clean vacuum flask ^{ix}
	Neutralise acid from the “wireless accumulator” to stop damage to furnishings ^x	Soothe sore eyes from over-chlorinated swimming pools. ^{xi}	Remove iodine stains from textiles ^{xii}
	Misuse: Deliberately damage grass, writing offensive slogans on golf course ^{xiii}	Remove smoke stains underneath mantelpiece ^{xiv}	Remove scorch marks from textiles ^{xv}
		Slow coal burning, save fuel ^{xvi} (despite ‘fuel saving compounds’ having no effect) ^{xvii}	Rinse eyes after exposure to mustard gas ^{xxi}
		Clean oven, save fuel ^{xviii}	Remove grass stains from textiles ^{xxii} Clean silk stockings ^{xxiii}
		Soften water, save soap ^{xix} Make bath salts ^{xx}	An ingredient in a homemade cleaner, with meths, paraffin, ammonia and borax. ^{xxiv} Treat mildew on roses (dissolved in water, known as “Russian method”) ^{xxv}

Date	Sodas		
	Caustic	Washing	Bicarbonate
			Essential larder item ^{xxvi} Use less sugar to sweeten fruit ^{xxvii} Cook legumes, save meat ^{xxviii} First aid kit ^{xxix}
1940s	Misuse: thrown at person ^{xxx}	Mixed with copper sulphate to prevent sand bags rotting ^{xxxi}	Ingredient in commercial fire extinguisher ^{xxxii}
	Winter wash for trees ^{xxxiii}	Make tea appear stronger ^{xxxiv}	
1950s	Misuse: fish killed by caustic soda in business dispute ^{xxxv}		Treat chilblains (mixed with malt vinegar) ^{xxxvi}
	Clearing blocked drains when other methods fail ^{xxxvii}		
1960s			Clean refrigerator ^{xxxviii} Clean melamine, cheaper than scouring powder ^{xxxix}
1970s			Clean freezer ^{xl}
1980s	Misuse: Cow and Gate baby food contaminated by extortionist/ blackmailer ^{xli}		
1990		“Environmentally friendly” cleaning product, as promoted by ICI ^{xlii}	

Table 3.1: Domestic uses and misuses of sodas. See endnotes for references.

However, although some users might have guessed Carbosil's chemical identity from the name, which was an amalgamation of **carbonate** and **silicate**, this point was never spelled out.³⁸ In contrast, the manufacturer of loose washing soda might not always have been known to the user, the user was at least certain that it was washing soda. Even though Crosfields aimed to set their product apart from common washing soda by asking "Why use soda when Carbosil costs no more?", market research revealed that most users understood Carbosil to be a type of washing soda, or perhaps a bleaching soda. Carbosil was advertised as grease-cutting, water-softening and making washing whiter, which users recognized as soda-like properties. However, some Carbosil users mistakenly, but understandably, associated "carb" with carbolic acid, the phenol-based disinfectant which was also incorporated into carbolic soap.³⁹

Between the 1930s and the 1960s, the readers of domestic manuals were generally assumed to have prior knowledge and understanding of which type of soda to use and what to do with it. Nevertheless, the Co-operative Wholesale Society (CWS) warned soda users that they should always thoroughly rinse any cooking implement that had been washed in soda, otherwise traces of it could spoil the next meal.⁴⁰ The Good Housekeeping Institute (GHI) which in 1950 explained the "correct", "intelligent" use of soda for cleaning, stressed that the soda had to react with hot water for five minutes in order for the water to be softened. GHI suggested that housewives made up, bottled and labelled a stock solution of soda using two ounces of soda in a quart of hot water, a recommendation not seen in any other sources.⁴¹ Planning ahead in this way saved having to dissolve the crystals, then wait for the water to soften each time hot soda water was required. If this method had delivered convenience, the advice would have been given more often and soda solutions may have been commercialised, but there was no evidence for this between the 1930s and the 1980s. More usually, advice on the

³⁸ Musson, *Enterprise*, 158-159, 198.

³⁹ "Carbosil," *The Sunderland Echo and Shipping Gazette*, 23 March 1932, 6; "A16 Clothes Washing – Motives and Methods," *Mass Observation*, 1939, 16. Whether by mistake or genuine belief, one of the M-O respondents named Carbosil and associated it with carbolic, claiming that they chose it because it was cheapest and best at disinfecting.

⁴⁰ *CWS Household Hints*, 29.

⁴¹ *Good Housekeeping's Household Hints Compiled and Tested by Good Housekeeping Institute* (London: National Magazine Company, 1950), 353.

amount of soda to use was vague, such as handfuls, “a little soda” or “a tiny knob”⁴², hence the end result depended on each user’s interpretation of the instruction. Sometimes more guidance was provided, as when the lump of washing soda was described in relation to a sixpenny piece,⁴³ or a walnut.⁴⁴

By contrast, Carbosil was powdered, and users were instructed that they only needed “a shake”, which related to its packaging (see Figure 3.2) but the directions also specified that this amounted to “a teaspoonful”.⁴⁵ Powders dissolved more easily than solid lumps of common soda, so dissolving quickly was a labour-saving quality unique to Carbosil. The fact that it was not “old-fashioned lump soda”,⁴⁶ may also explain why Carbosil was included on a shopping list for the hypothetical upper-middle class Edwardian “Mrs AB”, alongside other branded items Zebra grate polish, Globe polish and Gold Dust soap powder.⁴⁷

Social worker Maud Pember Reeves recorded the quantities of washing soda that women routinely bought in 1914, often seven pounds at a time and 3d was a usual price for this amount.⁴⁸ It was popular with working class women because it was cheap, and “made to do a great deal” including children’s baths and hair washing.⁴⁹ By the 1930s, two pounds of soda packaged in either tins or cardboard boxes became the main way that washing soda was bought. Once at home, soda could be transferred to a large, wide-mouthed jar kept by the sink where it was convenient to use, but also on display. Although soda jars appeared in photographs of kitchens (for example, Figure 3.1), they have been largely absent from museum collections, effectively erasing a chemical that was used in large quantities in the home.⁵⁰

⁴² “Economies in the Kitchen,” *MG*, 24 July 1940, 3.

⁴³ “Shoes at the Seaside,” *MG*, 07 August 1934, 6.

⁴⁴ Joan Dixon and Kathleen E. Fletcher, *Laundry Work* (London: Pitman, 1974).

⁴⁵ “Carbosil,” *The Sunderland Echo and Shipping Gazette*, 23 March 1932, 6.

⁴⁶ Musson, *Enterprise*, 158-159, 198.

⁴⁷ Victoria Kelley, *Soap and Water: Cleanliness, Dirt and the Working Classes in Victorian and Edwardian Britain* (London: Tauris, 2010), 50.

⁴⁸ Pember Reeves, *Round About a Pound a Week*, 60.

⁴⁹ *Ibid.*, 61.

⁵⁰ A lone, two-pound box of ICI soda was inside a washing machine at the Museum of Brands.

To give an idea of the quantities, if a pound of soda was dissolved in the sink each week to keep the pipes clear and fresh as the CWS suggested,⁵¹ who sold soda at their grocery stores, then housewives would have used 52 pounds of soda every year just for this purpose. Crosfields did not pretend that any less Carbosil would be needed, the packaging suggested that a two-pound box would last a fortnight, if it was only used for washing up dishes. Instead, Carbosil advertisements drew attention to the bulkiness of ordinary washing soda, indicating that this was a factor users considered undesirable and a reason for choosing the powdered brand (Figure 3.2).⁵²

The Carbosil advert in Figure 3.2 incorporated three different photographic images, which in 1932 was unusual because most other adverts used line drawings or stipple illustrations.⁵³ This technique communicated that Carbosil was modern, not old-fashioned like washing soda. The copy, laden with energetic exclamation marks, dramatized the everyday chore of washing up with the emotive words “hate” “destroy” and “detestable”. The advert redirected the housewife’s negativity from the drudgery of washing up to unpleasant grease, and did not promise to save labour.

During the Second World War, the availability of soda was important to domestic users because, unlike soap, soda was not rationed. Soda softened the water which saved soap, and Crosfields exploited this fact in their wartime Carbosil adverts, one of which is shown in Figure 3.3. The muscular, dynamic and masculine Carbosil used military language, it went “into action”, and has been illustrated leaping into the water before the soap. Meanwhile, the foamy, feminine soap had been saved from being worn out, ensuring that she would do more work in total. “It’s save, save, save all the time with Carbosil”, which referred to the soap, the time that would have been spent scrubbing clothes and the clothes that would not be worn out by rubbing. Soda was frequently promoted through household hints in newspaper articles as a useful way to save soap, coal and gas (Table 3.1).

⁵¹ CWS Household Hints, 22.

⁵² “Carbosil,” *The Sunderland Echo and Shipping Gazette*, 23 March 1932, 6.

⁵³ Mark Tungate, *Adland: A Global History of Advertising* (London: Kogan Page, 2013), 28

You say . . . "I hate washing-up"
but you mean "I hate grease" . . . yet
you can now destroy grease utterly



**...SPARKLING
GLITTERING DISHES**
will show you how well!

GREASE! It's really only grease which is the detestable part of washing-up. If you can only get grease out of the way, washing-up won't worry you at all.

So use Carbosil—because it is specially made to make washing-up *greaseless*. Carbosil *dissolves* grease; you won't feel grease in the water or on your hands. No floating scum will settle on

the dishcloth or soil your china—Carbosil breaks grease up! Out come the crockery and cutlery bright and sparkling—*really clean and fit to eat off!*

You only need a shake of Carbosil in the bowl—a teaspoonful is enough. Carbosil will not harm your hands, either. Sparkling china and grease-free washing-up for a penny a week!



Why use soda when Carbosil costs no more?

Soda is bulky, wasteful. A whole handful of soda doesn't do as good a job as a teaspoonful of Carbosil, because soda does not have the special grease-dissolving action of Carbosil.

2^D PER PACKET

CARBOSIL

Makes Washing-up GREASELESS

CAR 78-86-60

JOSEPH CROSFIELD & SONS LTD., WARRINGTON

Figure 3.2: Carbosil (1932) The advert gave the user reasons for choosing Carbosil, and made it clear that Carbosil was not just common soda. © British Library Board (*The Sunderland Echo and Shipping Gazette*, 23 March 1932)

I GO INTO ACTION FIRST TO SAVE **YOU**, SOAP

CARBOSIL, YOU'RE GRAND! THE TIMES YOU'VE SAVED ME FROM BEING WORN OUT!

CARBOSIL SAVES SOAP
- gets more work from it!

It takes only a second or two to put Carbosil in the water *first*—but it saves soap, saves your time, and saves the clothes afterwards. Simply because Carbosil's special job is to neutralise the lime hardness of water. Then your soap or soap powder gets to work **AT ONCE**. Its *full* power goes on getting out dirt. That's how Carbosil saves soap!

CLOTHES REALLY WHITE
You'll be amazed to see how dazzling white the clothes are when Carbosil goes in the water first.

That's because they're made so *clean*. And you get this wonderful cleanliness without the hard rubbing that damages any fabrics. The clothes are washed thoroughly, but treated gently!

WATER REALLY SOFTENED
Carbosil does a complete job of water softening, so naturally you get amazing results. But there's nothing harsh or harmful in it. Carbosil is absolutely *safe* for washing clothes or for washing up. It's *save, save, save* all the time with Carbosil.

CARBOSIL

In big 2½ packets

CAR 189-783 JOSEPH CROSFIELD & SONS LTD., WASHINGTON

Figure 3.3: Carbosil saves Soap (1941) © British Library Board (*The Sunderland Echo and Shipping Gazette*, 23 March 1932).

However, during the Second World War, both Crosfields and ICI were affected by Government control orders on metals and paper, which in turn impacted the production and supply of soda to all users. ICI placed an advert in *The Times* to announce, that in response to the 1940 paper control order, they would forego all packaging, and therefore branding, until they could box their soda in cardboard of appropriate quality (Figure 3.4). The aim of the advert was to reassure soda users that, although they could no longer buy the branded boxes, the loose soda they obtained from their grocer was of the same ICI quality.⁵⁴

⁵⁴ "Imperial Chemical Industries," *TT*, 17 October 1940, 3.

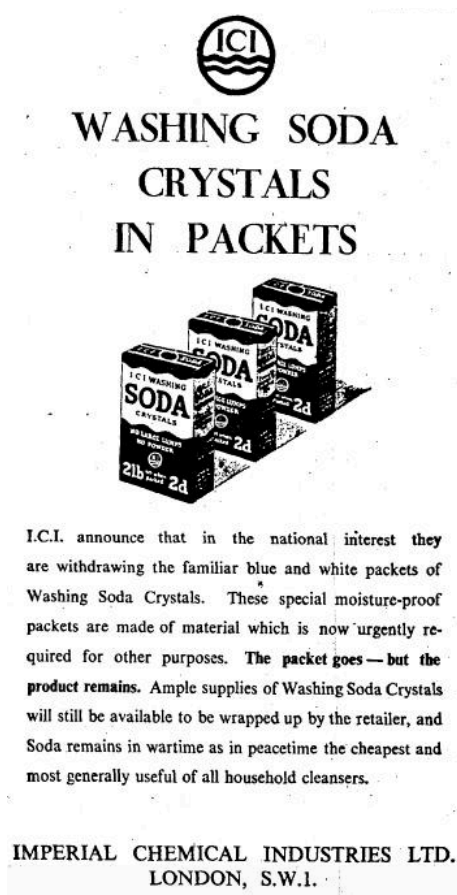


Figure 3.4: ICI's response to the paper control order ©The Times Digital Archive 17 October 1940.

ICI kept their activities in the public eye with a series of profile-raising, morale-boosting and educational adverts called "In the Services of an Industry". The message was that the chemical industry, producers of domestically-useful sodas among many other chemicals, was integral to everyday life. Yet Crosfields quietly discontinued Carbosil in 1941, even though they had advertised the product as if nothing would change in that same year (Figure 3.3). Albert Musson, historian of Crosfields, has identified that the decision to stop manufacturing Carbosil followed demands from military procurement officers who wanted Crosfields' soap to be increasingly standardised, as well as to use the glycerine destined for soap for explosives, which diverted energy and raw materials away from other civilian products such as Carbosil. The needs or demands of one type of user, the military, who did not use Carbosil but other chemically related products, therefore lay at the heart of the decision to cease production of Carbosil, a successful household product. Musson has linked the government's wartime requirements to a larger picture of disappearing brands and

reduction of competition.⁵⁵ However, he has not addressed the question of why Carbosil production was not resumed after the war.

By 1947, there was a general shortage of soda that was blamed on steel shortages. The lack of steel prevented new manufacturing plant from being built,⁵⁶ which affected multiple industries that relied on soda: glass manufacturers reduced output and dismissed workers, jam jar shortages were feared, laundries had to find substitute water softeners and suggested that housewives should too. British army wives who complained about lack of soda in Germany were told that housewives in Britain experienced the same shortage and any kind of washing soda became increasingly difficult to get towards the end of 1949. However, other than an occasional letter to a local newspaper which expressed annoyance at traipsing around town looking for an elusive product, there was little other evidence of domestic users' discontent with the general soda shortage.⁵⁷

In early 1950, Olby's store announced in the local paper the arrival of a large consignment of ICI two-pound cartons of washing soda.⁵⁸ Declaring the brand to be ICI indicated that the customers cared about this detail. Until the late 1940s, ordinary washing soda had been such a common product that it had not warranted large scale promotion. ICI had only advertised their soda crystals when they needed to explain changes to the way they were sold. In contrast, Carbosil as a branded product with added value (it was powdered and it contained silicate) had been promoted with eye-catching images.

The 1950s was also when announcements about soda were taken over by retailers, rather than the manufacturer. Soda was usually marketed as one option among many other household cleaning products, such as in a 1959 Woolworths advert that offered "Quality washing soda", as well as washing up liquid and disinfectant. Soda

⁵⁵ Musson, *Enterprise*, 346.

⁵⁶ Thomas Moore and Stafford Cripps, "Steel (Export)," HC Deb *Hansard* (08 July 1946): vol 425 c11W.

⁵⁷ "Dim Outlook," [Pilkingtons sheet glass] *Dundee Evening Telegraph*, 31 July 1947, 4; "In Brief," [Aloha glass works sacked 100] *Gloucester Citizen*, 13 April 1948, 7; "Salt Shortage," *Nottingham Evening Post*, 16 October 1947, 1; "In Britain Too," *Western Morning News*, 14 January 1948, 3; "Question Box: Women are asking..." *Motherwell Times*, 27 February 1948, 6; "Where's All the Soda?" *Daily Express*, 05 October 1949, 3.

⁵⁸ "Soda," *Dover Express*, 10 February 1950, 16. The price per carton was 4d.

was represented by a plain box without any visible distinguishing brand names or manufacturer.⁵⁹ Soda was not exciting or special.

The increasingly lowly position of washing soda can be illustrated in further detail through the situation faced by Boots chemists. Boots experienced reduced demand from users, as well as pressures from manufacturers relating to increased costs associated with production and distribution of washing soda. Reluctant to raise the price of such a basic product, Boots questioned whether it was worth continuing to retail loose soda at all. For these market leaders in self-service shopping, it was more convenient to sell pre-packaged 2lb cartons.⁶⁰ In 1967, following further price increases from ICI, Boots chose to forgo the loose soda.⁶¹ While their suppliers did not directly replace soda with more complex products, the packaged branded soda nevertheless had to compete with numerous modern detergents. By 1968, Boots' own market research surveys on household products did not even include soda. Instead, they focused on detergents, soaps and dedicated products, such as oven cleaner and toilet cleanser, which had all been identified by company strategists to be what domestic users wanted.⁶² This change suggests that users found convenient cleaning products more appealing and part of their modern lives.

The apparent absence of complaints from domestic users about the decline of soda in the 1960s can be explained if the new detergents and cleansers addressed long standing dissatisfactions with soda. For instance, aluminium darkened and pitted when cleaned with ordinary soda.⁶³ A 1933 Carbosil advert compared itself to soda, highlighting further disadvantages of using soda: "never harms colours on china, does not make hands red or rough".⁶⁴ In 1939, Mass Observation (M-O) interview respondents held soda responsible for rough, red hands. However, whether the women were feeding back their own experiences or the marketing propaganda put out by non-

⁵⁹ "Woolworths," *Daily Express*, 06 February 1959, 11.

⁶⁰ Letter from P. Davies, 08 January 1964, "Thawpit, ICI," Boots Archive.

⁶¹ Letter from F.C. Perry, 01 September 1967, "Washing Soda," Boots Archive.

⁶² "Household Products Survey: Trends in and the Future for Household Cleaning Products," 1968, Boots Archive.

⁶³ "Cleaning Enamel and Aluminium," *MG*, 01 August 1924, 6.

⁶⁴ "Carbosil," *The Sunderland Echo and Shipping Gazette*, 31 May 1933, 4.

soda cleansers is difficult to say, especially when some M-O officers reported that women repeated advertising slogans to make their points about why they chose certain products and how they used them.⁶⁵ Nevertheless, the same research recorded users' sentiment that soda was associated with "the olden days" and that using it was old-fashioned.⁶⁶ Soap rationing, combined with the soda shortage towards the end of World War Two, motivated users to switch from using soda to the readily available new soapless, synthetic detergents. Then, when problems with soda production were overcome and soda appeared in the shops once more, not everybody wanted to go back to using it. Detergents and cleansers that incorporated water softeners and grease solvents meant that additional, bulky soda was unnecessary. Extra care did not have to be taken to avoid aluminium being ruined by coming into contact with soda. At not much extra cost, new products promised to make tedious tasks easier, more pleasant or appreciated, by the addition of fragrance. Nevertheless, soda could still be obtained by those who really wanted it, such as housekeeper Grace Higgens.⁶⁷

Soda's effectiveness did not change but attitudes towards it did. Soda had become associated with necessity and hardships: it was a constant feature of domestic advice that urged housewives to save soap, to clean their ovens and improve fuel efficiency (see Table 3.1). The advent of detergents that contained phosphate, which softened the water and therefore did not require an extra water softener, made washing soda redundant. Housewives appeared to willingly leave the era of soda use behind them, to participate in the optimistic, consumer revolution of bubbly, scented products that were luxurious in comparison to utilitarian soda.

The new detergents, however, had unexpected effects, including making soda attractive once more, at least to a segment of users concerned about the potential for chemicals to harm the environment. Synthetic detergents caused persistent foam, although the substituted foaming agent was blamed for being more harmful to fish,⁶⁸

⁶⁵ "A16 Clothes Washing – Motives and Methods," Mass Observation, 1939, 26, 28, 31.

⁶⁶ *Ibid.*, 4.

⁶⁷ Tessa Boase, *The Housekeeper's Tale* (London: Aurum Press, 2015), 260.

⁶⁸ Chris Knud-Hansen, "Historical Perspective of the Phosphate Detergent Conflict," 1994, http://www.colorado.edu/conflict/full_text_search/AllCRCDOcs/94-54.htm (accessed 02 August 2016); Barry Commoner, "The Progress That Pollutes," *The Observer*, 09 January 1972, 9.

and the perception of environmental problems with detergents continued. In the mid-1960s, phosphates, rather than foam, were in the spotlight when domestic wastewater was charged with causing the eutrophication of America's Great Lakes.⁶⁹ Phosphate, as a plant nutrient, overfed the aquatic plants and the large volume of growing, and decaying, vegetation caused the subsequent suffocation of the watercourses. British newspapers followed the American story closely: they reported on the interests of British phosphate manufacturers and denied that the phenomenon was a problem in Britain because of our different geography.⁷⁰

Nevertheless, the role of domestic detergents in water pollution meant that laundry became a cause for public concern in Britain and new low or no-phosphate detergents were introduced to the British market. A research scientist at Unilever blamed the unenthusiastic reception of these products on "bewildered" housewives, who held the wrong attitudes and used inefficient methods.⁷¹ According to the scientist, every perceived shortfall of the new detergents could be rectified if women did more work, despite the fact that Unilever prided itself on relieving domestic drudgery.⁷²

The labour of domestic users was further increased when the detergent companies altered their phosphate content in response to users' concerns and the number of detergent choices further expanded. Domestic users were ultimately given the responsibility to assimilate the advantages and disadvantages of phosphate and non-phosphate detergents, then scrutinise their packaging in order to choose the product that was most suitable for their individual domestic situations. The causticity of phosphate-free detergents was highlighted as the cause of tragic domestic accidents, when inquisitive children ate them, and was a therefore a reason to choose phosphate-based detergents, even if they were worse for the environment.⁷³ In the face of all these decisions, old-fashioned, familiar washing soda became a simple, safe choice. Another

⁶⁹ Terence Kehoe, "Merchants of Pollution?: The Soap and Detergent Industry and the Fight to Restore Great Lakes Water Quality, 1965-1972," *Environmental History Review* 16 (1992): 21-46.

⁷⁰ Peter Rodgers, "Postponement Vital to Albright and Wilson," *TG*, 30 December 1970, 13; "Lakes May Recover Quickly from Pollution," *TG*, 06 September 1976, 4.

⁷¹ Lewis, "Sud Standard," 11.

⁷² Ernest Woodroffe, "Unilever: Meeting the Demands for a Better Standard of Life," *TG*, 20 May 1973, 22.

⁷³ Simon Dresner, "The Detergent Mess... What to Tell Your Wife," *Popular Science*, January 1972, 14, 126.

issue in 1970s Britain was inflation associated with the oil crisis and economic recession, which meant that some housewives sought to economise. Multipurpose soda was recommended as a way of controlling the household budget, in conjunction with shunning specialist cleaning products.⁷⁴ More elementary information about using soda tended to be given in household manuals, such as that it could be obtained at supermarkets, which indicated that it had become hard to find. By the 1980s however, the recession was lifting and much of the urgency about detergent pollution had dissipated because wastewater treatment had improved.⁷⁵

Britain's soda manufacturers had not been so directly engaged with their domestic consumers' budgeting issues or washing soda's potential to alleviate a pressing environmental problem as Church and Dwight had, in 1970. The American company had promoted their baking soda as a non-polluting cleaner free from phosphates, which users could choose in order to "save" the waterways.⁷⁶ In 1990 ICI eventually took advantage of the environmental concerns associated with synthetic detergents and rebranded their soda crystals as environmentally friendly. However, the company was immediately lambasted by the environmental organisation Greenpeace. Their anti-corporate agenda meant that they could not get behind ICI's message. Instead, Greenpeace drew attention to the manufacturing costs behind the product and the company's history of pollution.⁷⁷ Nevertheless, the activist organisation promoted soda without mentioning the costs of producing soda either from brine or mining trona (which by the 1980s was the main production method in the USA), when it suited them, such as in their *Stepping lightly on the Earth* shopping guide.⁷⁸

The transformation of soda from a ubiquitous product for everyday use, to one with a reputation of environmental friendliness, has so far been overlooked by

⁷⁴ Jo Hatcher, *Home-Making on a Budget* (Wellingborough: Thornsons, 1977), 1, 28; Shirley Conran, *Superwoman: Everywoman's Book of Household Management* (London: Sidgwick and Jackson, 1975), 22-25.

⁷⁵ James Erlichman, "Two Green Fingers: Brandwagon," *TG*, 05 January 1990, 31; Knud-Hansen, "Historical Perspective".

⁷⁶ Knud-Hansen, "Historical Perspective".

⁷⁷ Nick Nuttall, "ICI Accused of 'Green' Deception," *TT*, 07 June 1990, 6.

⁷⁸ M. Elliot et al., *Stepping Lightly on the Earth: A Guide for Clean Living* (Dublin: Greenpeace, 1993). This publication was first distributed in 1987 as a 4-page pamphlet, by 1993 it was a 35-page booklet.

historians. Nevertheless, this pattern of an “old” technology being rediscovered, as the solution to a modern problem, in this case environmental pollution, has been identified and described by Edgerton.⁷⁹ Unfortunately, the boundaries of this thesis mean that further exploration of washing soda as an eco-friendly alternative to detergents, which in Britain became a marketing phenomenon more correctly located in the 1990s and beyond, cannot be fully addressed here.

What this case study has shown is that washing soda was multipurpose and it was not harmful enough to be involved in accidents or serious misuses. Despite its utility and harmless nature, it became harder for users to access between the 1940s and 1960s because of changes in manufacturing, distribution and retail, as well as the existence of many competing cleansers. Raised environmental and budget consciousness in the 1970s meant that affordable soda was heralded as a wise choice, but for saving money, saving worry and saving the environment instead of saving soap, time or clothes. The next chemical studied in this chapter saved time and clothes, but not the environment.

Carbon Tetrachloride

Carbon tetrachloride (CT) is a case study because it was available before 1930 as an unbranded product obtained from a pharmaceutical chemist, as well as being the “active” ingredient in a number of branded consumer products, such as Thawpitt cleaning fluid. CT was first synthesised in 1839, by the French experimental chemist Henri Victor Regnault who reacted chloroform with chlorine. CT’s initial use as an anaesthetic made the chemical of interest to historians of medicine,⁸⁰ while historians of chemistry have tended to focus on the changes to CT’s nomenclature, and its role in the development of organic chemistry.⁸¹ Although American military and industrial uses of

⁷⁹ David Edgerton, *The Shock of the Old: Technology and Global History since 1900* (Oxford: Oxford University Press, 2007), 49-51.

⁸⁰ A. G. McKenzie, “Carbon Tetrachloride as an Anaesthetic,” in *History of Anaesthesia Society Autumn Scientific Meeting*, 2003, 7-11.

⁸¹ Aaron J. Ihde, *The Development of Modern Chemistry* (Mineola: Courier Dover Publications, 1970), 217-218; Alan J. Rocke, *The Quiet Revolution: Herman Kolbe and the Science of Organic Chemistry* (Berkeley: University of California Press, 1993), 49, 181-185.

the chemical have been comprehensively studied, this is the first time a history of CT from the view of the British domestic user has been attempted.⁸²

In Britain, industrial manufacture of CT began in earnest after the First World War, when chemical companies sought a use for excess chlorine. Chemical manufacturers had increased their capacity to produce chlorine in response to the demand for poison gas shells.⁸³ Only when CT was produced on a large scale did the clear, colourless liquid with a characteristic sweet smell become more widely used at home.⁸⁴ CT was a newly established domestic chemical in the 1930s. Domestic users embraced CT as an effective grease remover, which was promoted as a safer option to using benzine, as it would not catch fire. Although historians of chemistry, including E.M. Cammidge, have stressed that benzene, a pure hydrocarbon derived from coal tar, should not be confused with benzine, a mixture of hydrocarbons produced from petroleum, concern for this distinction has not been found within the British or American domestic advice literature consulted for this thesis.⁸⁵ Therefore, I use the spelling given in the advice, rather than attempt to deduce which of the two chemicals was actually employed. In the domestic advice literature there was inconsistency and no explanation given to the distinction between benzene, benzine and other spellings. For instance, a piece of British market research listed the answers given by users as “Benzine (including benzol – benzoline – benzoin)”⁸⁶ which further demonstrates the indifference, ignorance or confusion towards the chemicals, because all of these substances were quite different.⁸⁷ No clear

⁸² Robert D. Morrison and Brian L. Murphy, *Chlorinated Solvents: A Forensic Evaluation* (Cambridge: Royal Society of Chemistry, 2013); Mark G. Smith, “Preliminary Study of Sources of Carbon Tetrachloride Final Report,” GCA Corporation GCA/Technology Division, 1983, 2-5; Richard E. Doherty, “The Manufacture, Use and Supply of Chlorinated Solvents in the United States During World War II,” *Environmental Forensics* 13 (2012): 7-26.

⁸³ Fred Aftalion, *A History of the International Chemical Industry* (Philadelphia: Chemical Heritage Foundation, 2001), 182; Morrison and Murphy, *Chlorinated Solvents*, 160; Hugh Podger, *Albright & Wilson: The Last 50 Years* (Sudley: Brewin Books Ltd, 2002), 3; “Proposed processes” DIC/BM 20/150/31 1903-1907 ICI, Archives of Brunner, Mond and Company Ltd and its subsidiaries, Cheshire and Chester Archives and Local Study Services.

⁸⁴ Smith, “Preliminary Study of Sources of Carbon Tetrachloride Final Report,” 2-5.

⁸⁵ E.M. Cammidge, “Benzene and Turpentine: The Pre-History of Dry Cleaning,” *Ambix* 38 (1991): 82.

⁸⁶ Thawpit Consumer Investigation 1945, Table 8, HAT 50/1/175/3.

⁸⁷ Benzine is an American term for petroleum ether, or naptha, and for Americans in the 1920s and 1930s it was cheaper than refined benzene so was therefore recommended for use in dry cleaning. Benzol and benzoline were both crude benzene, or benzene mixed with toluene. Benzoin is also known as bitter almond oil camphor, and I have not seen it named as a stain remover.

interpretation of this problem has been forthcoming, but it can be considered a result of the influence of American domestic advice on British writers.⁸⁸ Nevertheless, fire was a definite hazard associated with both benzine and benzene. Fire-safe CT vapours were initially described as no more dangerous than benzine, although they could make the user “drowsy”.⁸⁹ However, by the late 1960s, CT was considered the most toxic among the cleaning fluids then available.⁹⁰ In America in the 1970s CT began to be formally phased out of consumer products to protect the groundwater and human health. The International Agency for Research on Cancer had begun to study CT which had been shown to cause liver tumours in experimental animals, although occupational and population studies of humans were inconclusive.⁹¹ Chlorinated halogens were also implicated in ozone layer destruction in the 1980s, so as a member of this group CT was pinpointed as a hazard to the environment, as well as to human health. Since 2002 CT has been banned from consumer products in Britain.⁹² Other newly synthesised chemicals, such as perchloroethylene, which were not flammable, but were highly efficient stain removers and did not appear to be so harmful began to replace CT. The next section of this chapter considers one of the earliest domestic uses of CT: personal grooming.

Hair care

From 1903 CT was used by British women who used the volatile solvent as a dry shampoo to freshen their hair. Initially, this use was the domain of professionals at the hairdressing salon, but women were soon giving themselves CT treatments.⁹³ Exactly how the notion of using CT for cleaning human hair came about has not been clear. It was not recommended in Thawpit’s promotional leaflet, although fur coats and stoles are somewhat similar to hair. Avoiding a full wet wash – which before the widespread

⁸⁸ Peter Morris, personal communication, email 20 July 2016.

⁸⁹ William Brannet, *The Practical Dry Cleaner, Scourer and Garment Dyer*, 4th edition (Philadelphia: Henry Carey Baird & Co, 1911), 19; HAT 50/1/175/2 memo by G.A. Holdsworth (19 March 1935).

⁹⁰ Alma Cheshunt Moore, *How to Clean Everything* (London: Tom Stacey Ltd, 1972), 172; Elizabeth Gundrey and Jean Carper, *Stay Alive: How to Avoid Accidents in the Home* (London: MacGibbon & Kee, 1967), 95.

⁹¹ Morrison and Murphy, *Chlorinated Solvents*, 162.

⁹² Toxicology Department “Carbon Tetrachloride – General Information,” Public Health England, 2009.

⁹³ “An Anaesthetic Shampoo,” *BMJ* 2, no. 2438 (1907): 764-65.

installation of domestic plumbing and reliable hot water systems might necessitate heating, transporting and disposing of water – as well as the subsequent potentially chilly drying period, would certainly have been a benefit of using CT as a “dry” cleaner for hair.

However, the nature of the chemical and its anaesthetic, cardio-depressant effects meant that haircare was a fairly short-lived use. During the inquest following the accidental death of a customer having a dry shampoo at Harrods in 1909, the hairdressers stated that they had been using CT without incident for six years, which they estimated to represent a total of “20 or 30 000” dry shampoos. The salon at Harrods was clearly an expert space, yet when referring to the fatal accident, the hairdressers were characterised in the courtroom by medical doctors as non-experts. Although the hairdressers may have known how to get results that pleased their clients, they did not have the same knowledge about CT’s chemical properties as the physicians. This difference was exemplified by the fact that the hairdressers attempted to treat the stricken client, who was overcome by CT during her hair treatment, by laying her on the ground to recover. To the scientific men who understood that CT vapour sank to the ground, this was the worst possible place to put the patient, who would be further exposed to the suffocating substance.⁹⁴

There is no indication of the prevalence of using CT for dry shampooing at home in the early 1930s, but by 1934 the *British Medical Journal (BMJ)* was able to report that this practice had stopped as other, safer (unnamed) products had become available.⁹⁵ However, CT was still recommended and used to clean hair pieces.⁹⁶ Men and women used CT in this way: the Consumers’ Association found that two thirds of their toupee-wearing members cleaned their hairpieces themselves, and most used CT or other dry cleaning fluids.⁹⁷ To use CT safely, wigs and hairpieces should be cleaned by using cotton wool balls soaked in CT or by dipping the hair into a small saucer of solvent. Using cotton balls reduced the user’s close contact with the chemical so that they would be less likely

⁹⁴ “The Dangers of the ‘Dry Shampoo’,” *TT*, 25 August 1909, 2.

⁹⁵ “Carbon Tetrachloride Poisoning,” *BMJ* 1 (1934): 953-54.

⁹⁶ “Four Heads on One Girl,” *DM*, 05 December 1964, 7.

⁹⁷ “Men’s Hairpieces,” *Which?* Consumers’ Association, October 1969, 317.

to absorb it through their skin, and using a limited amount of CT minimised the amount of vapour that could be inhaled. Nevertheless, the vapours still caused problems. For instance, in 1969 a nurse in Glasgow, as advised by a chemist's assistant, cleaned her human hairpiece but neglected to properly ventilate her room. In the report of her poisoning and subsequent recovery, her doctor noted that ventilation was not emphasised on specialised hairpiece cleaners' packaging, nor by the instigators and perpetrators of wig cleaning behaviour, hairdressing schools.⁹⁸ Despite the nurse's medical training and contact with a chemist's assistant, these factors did not protect her.

The mass production of synthetic wigs in the 1970s was accompanied by a change in their care regimes. Manufacturers of these wigs recommended using gentle detergent shampoos rather than dry cleaning methods.⁹⁹ Additionally, CT and CT-based products began to be removed from the consumer market in the 1980s, and replaced with less harmful chemicals, such as trichloroethane. CT's status as "reasonably safe" was already being questioned in domestic manuals published in the 1950s,¹⁰⁰ and in 1971 the Joint Fire Research Organisation declared CT "one of the most toxic household substances known" even though by 1975 the use of CT had still not been banned in Britain.¹⁰¹ Despite the growing awareness of CT's toxicity, this potentially dangerous chemical had nevertheless been welcomed into many British homes as a useful domestic cleaning agent. The next section considers household cleaning and stain removal with CT in more detail.

Household cleaning, stain removal and Thawpitt

In the late 1920s advice to use CT for household cleaning became widespread and CT was described as "readily procurable".¹⁰² That CT was not very widely used before 1920 is confirmed by its absence from the fifth edition of Wynter Blyths' book on

⁹⁸ Ronald J. Weir, "Carbon Tetrachloride Poisoning as a Hazard of Wig Cleaning," *BMJ* 1 no.5 643 (1969): 487.

⁹⁹ "Valmor High Fashion Wigs," *Ebony*, June 1973, 79.

¹⁰⁰ Moore, *How to Clean Everything* (1972), 174.

¹⁰¹ Quoted in K.E. Marsden, "This Cleaning Fluid Is Dangerous If Used Foolishly," *Care in the Home* (July 1975): 21.

¹⁰² "Spots and Stains," *MG*, 01 January 1926, 6; *The Harpic Home Book*, 107.

poisons, which contained many other chemicals commonly found in the British home.¹⁰³

It was already known from hairdressing accidents that CT's vapours were dangerous. However, the easily taken protective measure of using the solvent in a well ventilated space, or outdoors, meant that exposure to CT's harmful vapours could be managed.

A branded form of CT, Thawpit, was marketed by Captain Thomas Thorpe in the 1920s. An undated Thawpit leaflet, probably from the 1920s, set out the many scenarios in which the solvent was useful. The leaflet extolled the potential for general housework including "removing verdigris from geysers", as well as the masculine cleaning activities of polishing car headlights and removing tar from tobacco pipes.¹⁰⁴ This multipurpose appeal could be expected to sell Thawpit to a wide range of users, who if they used Thawpit in all the situations advised by the leaflet, would rapidly use up the product then have to buy more. No doubt CT was an effective cleaning agent, but when compared to more readily available, cheaper alternatives that were as effective, Thawpit appeared extravagant. This was the verdict reached by user-focused, evidence-driven advertising agency JWT, who had been hired by Thorpe in 1934.¹⁰⁵

In order to understand Thawpit's users, JWT instigated regular market surveys of existing customers and asked about their use of Thawpit for the care of textiles in particular, as well as for more general grease removal that was required around the home. JWT found that very few users cleaned whole garments at home. Instead, they used Thawpit for spot cleaning and generally bought it when they needed it, or slowly used a bottle they kept at hand. JWT's research suggested that focussing on textiles, rather than all the other household uses for Thawpit, would be beneficial. Broader market research carried out on dry cleaning in both in the UK and USA revealed that most domestic users did not realise that the process involved total immersion in a liquid and did not know that this liquid could be reused after the removed dirt settled as sediment.¹⁰⁶ Although Thorpe wanted JWT to promote home dry cleaning which would

¹⁰³ Alexander Wynter Blyth and Meredith Wynter Blyth. *Poisons: Their Effects and Detection*, fifth edition (London: C. Griffin & Company, 1920).

¹⁰⁴ Thawpit leaflet, nd, personal collection.

¹⁰⁵ HAT 50/1/175 Sub-series description in Admin History.

¹⁰⁶ HAT 50/1/175/3 McCall Corporation, "The Home Market for Fabric Tints and Dyes, Spot Cleaners, Rug and Upholstery Cleaners," (1951).

use a larger amount of Thawpit, the agency resisted this request and found a compromise that would not endanger home users who attempted to work with large volumes of a chemical that could make them “drowsy”.¹⁰⁷

The compromise that JWT opted for was to suggest that users should clean more often, therefore increasing the rate that CT was used up and bought again. The agency wanted to change user behaviour, by moving away from spot cleaning stains to encouraging users to give garments a “going over”, which meant being ready to refresh the entire surface. Users were instructed to pay particular attention to high-wear, visible areas such as collars, cuffs and shirt fronts. Between 1941 and 1949, clothes rationing was in operation, a fact seized upon by JWT, as well as Thawpit’s competitor Beaucaire, as both attempted to persuade users to choose their products to make clothes last longer and save clothing coupons.¹⁰⁸ JWT ran a “reason why” campaign in 1942 which showed a suit on a hanger,¹⁰⁹ and one in 1945-46 that added a more psychological component to the practical information with a tagline “X marks the spot”. These adverts showed someone aghast after noticing dirt on their date’s clothing, which quashed any romantic feelings (Figure 3.5 for both).¹¹⁰

“X marks the spot” used JWT’s tried and tested psychological approach that capitalised on personal inadequacy and social anxiety, which they had found worked especially well with health and hygiene products; whereas advertisements based purely on facts fared better for durable goods that were seen as investments.¹¹¹ These adverts were run as series which showed women’s suits, men’s suits, as well as women being put off men who had not taken care of their clothing. Therefore, Thawpit addressed both sexes as potential users and beneficiaries of the dry cleaning chemical. The adverts described how to apply the liquid using a piece of fabric, which was described as a rag in the advert directed at men’s suits and as a clean cloth in the advert which spoke to

¹⁰⁷ HAT 50/1/175/2 Memo by GA Holdsworth (19 March 1935).

¹⁰⁸ “Beaucaire: This Bottle Saves Dozens of Coupons,” *Lincolnshire Echo*, 16 December 1942, 2.

¹⁰⁹ “You Can Clean Your Suits at Home,” *Northern Daily Mail*, 24 July 1945, 6.

¹¹⁰ “X Marks the Spot,” *Northern Daily Mail*, 16 June 1946, 7.

¹¹¹ Regina Lee Blaszczyk, “Marketing Pyrex Ovenware,” Chapter 10 in *Major Problems in American Business History* (Boston: Houghton Mifflin Company, 2006), 324.

women. Another feature of the adverts was an image of Thawpit's distinctive hexagonal bottle.

You can CLEAN YOUR SUITS AT HOME

—and keep them clean!



THERE'S no need to go around in a spotted and dirty suit. A very little Thawpit on a clean rag takes out all grease and dirt completely. Don't wait until you spill something on your suit before you clean it. The collar, lapels, and cuffs are the first places to show dirt. Treat them with Thawpit regularly and they will last much longer.

Thawpit is simple and easy to use — follow directions on bottle. It doesn't harm any fabric, doesn't affect colour, leaves no odour. It's perfectly safe because it can't catch fire!

THAWPIT
cleans clothes

1/-



(X) marks the spot where Cupid was *defeated*



CLEAN FRESH CLOTHES are a credit to you. What's more, clean clothes last longest! So it's well worth while perking up a dress or suit after every wearing.

Just moisten a clean cloth with a little Thawpit and go over the back of the collar, elbows, and cuffs—they catch dirt first. But look out for any other soiled places. And don't wait until a garment is noticeably grimy.

Thawpit is easy to use. Just follow directions on the bottle. It doesn't harm delicate fabrics or change colours. Safe to use anywhere, because it can't catch fire.

LEAVES NO ODOUR
CAN'T CATCH FIRE

Price 1/-



Figure 3.5: JWT's functional and emotional appeals, © British Library Board (The Northern Daily Mail, 25 July 1945, top) and (The Northern Daily Mail, 16 June 1946, bottom).

A closer look at that hexagonal bottle can also give clues as to how Thawpit's container determined how the product was used at home. Figure 3.5 shows that both adverts carried images of the bottle, which was made of glass, and was colourless, clear, and hexagonal, stopped with a cork. The cork was later replaced by a screw top. Two sides of the bottle were ridged, a well-established tactile and visual signal used on

bottles containing poisons. This message was reaffirmed by the embossed phrase “Not to be taken” on another side. A warning to not breathe the vapours was included on the paper label fixed to the remaining three smooth sides of the bottle, which instructed users to keep the bottle tightly corked (in order to prevent evaporation and wastage) and to avoid using it in confined or unventilated places. Although Thorpe had wanted users to use up Thawpit quickly, he presented the solvent in a narrow-necked container that facilitated meagre usage. Nevertheless, this simple bottle afforded users freedom in how they used the solvent, for instance by pouring it into a saucer.

This figure had been removed due to copyright restrictions

Figure 3.6: Taken from an internal Boots magazine (1954), this image shows Thawpit’s new packaging with the cleaning pad attached to the bottle, although the recognisable hexagonal shape was retained. ©The Walgreens Boots Alliance Archive.

This relative freedom can be compared to applicator tips, which were fabric pads attached to the bottles (Figure 3.6) through which the solvent was applied to the grease mark, a packaging innovation that enforced a single use for the product. If a user accidentally knocked over a bottle of solvent, the applicator pads also stopped too much liquid from escaping.¹¹² Competing brands had pads permanently fixed to the top of their bottles, while Thawpit sold applicator tips separately. This presentation allowed Thawpit to appeal to users who either did not want or need an applicator pad, or were able to reuse them. These packaging choices gave users more options and freedom because, for some uses such as cleaning model train tracks, applicator pads were

¹¹² “Stain Removers,” *Which?*, February 1964, 61-64.

unsuitable.¹¹³ Applicator tops could be viewed as safer because cloths to which CT had been applied and CT spills from open bottles without applicators had both been associated with fatalities, further discussed in Chapter 6.

Improved labelling of CT cleaning fluids was discussed in the Houses of Parliament in 1965, which appears to have been a turning point in British awareness about the safety of CT, despite the long history of accidents associated with the chemical. The Home Department requested that labels on this type of cleaning fluid included the advice to keep out of reach of children and noted that most products already carried warnings against inhaling the vapour or using it in a confined space.¹¹⁴ Keen to understand what Thawpit was, as well as what it did, JWT asked for more information on the grease remover. Thorpe explained that it was the same chemical as that used in fire extinguishers.¹¹⁵ However, the readers of Thawpit's promotional material were not made aware of the chemical identity of the miraculous fluid. Although Thawpit's labelling and informational leaflets did not state what the cleaner actually was, the characteristic odour, qualities and precautions to be taken when using it identified it (at least to a chemically knowledgeable user) as being CT-based. Thawpit was pure CT, unlike other CT-based products which contained detergent, or were a mixture of solvents.¹¹⁶

As well as the caution needed to avoid accidents, users also required a great deal of care in order to remove stains satisfactorily. The benefit of buying Thawpit, compared to a bottle of CT from the chemist, was that the user also bought trustworthy information about how to best use it. For best results, CT had to be applied in a particular way in order to mitigate the appearance of a ring around the stain. The method of application could determine whether a user was satisfied or not with the result, so manufacturers of proprietary dry cleaning solutions worked hard to provide comprehensive instructions, up to date with new synthetic textiles and fashions.

¹¹³ "Smell Kills Boy Aged 6," *DM*, 20 October 1962, 6.

¹¹⁴ Nigel Fisher and George Thomas, "Written Answers: Cleaning Fluids," *Hansard* (26 April 1965): vol 711 cc20-1W.

¹¹⁵ HAT 50/1/175/2 memo by GA Holdsworth, 19 March 1935; HAT 50/1/175/1 Advance material for Thawpit Review Board, 31 December 1951 (meeting 7th January).

¹¹⁶ C. J. Polson, "The Role of the Pathologist in the Investigation of Fatal Poisoning," *Medicine, Science and the Law* 5 (1965): 203-210; Moore, *How to Clean Everything* (1972), 174.

Explanatory booklets full of diagrams accompanied their products and the same textual information appeared in domestic advice literature. This route of dissemination meant instructions that accompanied branded goods were not necessarily the only way to become informed about how best to use CT. Nevertheless, satisfaction with the end result was needed to keep users loyal to Thawpit, and instructions were regularly revised in light of information from users.¹¹⁷

Household hints columns never presented CT or equivalent branded preparations as the only option, instead they were the last resort when the greasy mark did not succumb to more common treatments of soap or ammonia.¹¹⁸ Simple, cheap, trusted and readily available methods co-existed alongside new chemical products. Getting a mark out quickly was more important than exactly which chemical was used to remove it. Cost and availability was another factor that domestic advice authors took into account, offering petrol and benzine as cheaper, although flammable alternatives.¹¹⁹

JWT's market research, as well as less formal "asking round the office" also repeatedly found that Thawpit's main rivals were ammonia and petrol, rather than similar branded CT-based products.¹²⁰ Numerous sources recommended petrol, even as late as 1965 in Lia Low's cleaning manual. Although she suggested CT for a great proportion of household cleaning, petrol and lighter fluid were recommended for removing Plasticine from a variety of household furnishing that it had become ground into.¹²¹

The benefit of using CT over petrol or lighter fluid was that it was not susceptible to catching fire. However, the vapours were potentially dangerous.¹²² JWT expressed frustration and incredulity that housewives had not grasped that Thawpit was non-flammable, but excused this by their lack of personal experiences of accidental fires, or

¹¹⁷ HAT 50/1/175/2 notes on report AW Parker (11 May 1951).

¹¹⁸ "Autumn and the Furniture," *MG*, 18 November 1926, 6.

¹¹⁹ "An Oil Remover," *MG*, 16 October 1930, 8.

¹²⁰ HAT 50/1/175/2 Letter from M.E. Mackendrick (10 March 1942); HAT 50/1/175/1 Market Research Report (1950).

¹²¹ Low, *Keep It Clean* (London: The Bodley Head, 1965), 106-7.

¹²² Brannt, *Practical Dry Cleaner*, 19.

because they “do not hanker to clean near a naked flame”. The lack of awareness regarding Thawpit’s main benefit indicates that fire safety was not the housewives’ main reason for choosing it. Instead, being able to buy the product at a number of different shops and being satisfied with the results were their priorities.¹²³

The ready availability of petrol, either sold in tubes from tobacco kiosks into the 1940s, or obtained from cars, meant that Thawpit also had to be easily acquired in order to compete with it as a grease remover.¹²⁴ However, petrol rationing meant that Thawpit was promoted as the ideal replacement for cleaning purposes. No evidence has arisen that suggests that British access to CT was restricted during wartime, in contrast to the situation in the USA. There, civilian supplies were severely limited so that barely sufficient volumes were available to industry and the military.¹²⁵ JWT’s advertising also emphasised the lack of smell and absence of fire risk inherent in using Thawpit, properties that, without actually naming petrol, referred to the drawbacks of that option. We also know that a characteristic smell was an identifying feature of CT, so when JWT claimed that Thawpit did not smell, they meant the lingering, obnoxious smell associated with fuel.¹²⁶

The relatively low price of petrol may have been a reason why it was used instead of Thawpit. Nevertheless, JWT’s market research showed that, even in low-income households, Thawpit was used, so cost cannot have been the only reason for using petrol. Additionally, a 1971 report by the Inspectors of Explosives doubted the accuracy of the widely held perception of petrol as cheaper than branded cleaning products. From a report compiled on accidents which included the inevitable accidental fires associated with using petrol in the home, the gender of those involved in petrol-related domestic cleaning accidents was reported ambiguously through the use of words such as “occupier” and “user”. This contrasted with the abundant masculine descriptors employed when reporting petrol-related accidents in the workplace. However, the report’s compilation of mishaps included the example of a man who had cleaned the

¹²³ HAT 50/1/175/2 Market Research report 03 May 1951, notes on report A.W. Parker (11 May 1951).

¹²⁴ HAT 50/1/175/2 Questions on Thawpit, 18 September 1941; Letter from M.E. Mackendrick (10 March 1942).

¹²⁵ Doherty, “Chlorinated Solvents,” 7-26.

¹²⁶ HAT 50/1/175/2 Market Research report (03 May 1951), notes on report AW Parker (11 May 1951).

carpets in his kitchen with petrol, and had been seriously injured when the gas pilot light ignited the vapours.¹²⁷ In cases such as this, the users had been cleaning diligently but perhaps thoughtlessly or in ignorance, so had not connected the presence of sparks or flames with the possibility of petrol vapour ignition. No rationale, other than cost, was conjectured or sought regarding these accidents. However, cleaning carpets and car upholstery could require more solvent than was needed for spot cleaning a garment. The small volumes that CT was sold in, as well as the well-known harmfulness of its vapours in enclosed spaces, and its increasingly dubious status as benign even when used carefully, were likely factors in decisions to use petrol.

Some users read the warnings and judged that CT could be deliberately ingested or inhaled in suicides.¹²⁸ CT was not a “favourite” poison, and by the mid-1960s was a “perhaps diminishing” choice.¹²⁹ Despite its usual description as a cleaning fluid in these incidents, those who used CT with suicidal intent at home were male, a group typically thought of as using more violent methods, rather than domestic household cleaning chemicals.

CT’s lethality even inspired fiction. An example of this can be found in Leslie Charteris’ crime story *A Cleaner Cure*, where this common household chemical is put to fatal use on a cleaning lady’s abusive, drunkard husband. A medical doctor discusses CT’s effects on the body and how they were worsened with its interaction with alcohol. The protagonist, The Saint, expresses surprise with “Why aren’t people dropping dead all the time?” The fictional medic concedes that “It’s a wonder it doesn’t happen more often. Everyone thinks carbon tet is harmless, but that’s because it doesn’t catch fire or explode”. The Saint muses about CT as a murder weapon, and the medic points out that its use would be detected by visible effects on internal body fat.¹³⁰ In practice, pathologists tended to be alerted to CT’s involvement by its characteristic smell,¹³¹ but

¹²⁷ “Report of Her Majesty’s Inspectors of Explosives for the Year Ended 31st December 1970” (London: Home Office, 1971), 41.

¹²⁸ “Tent of Death,” *TG*, 21 January 1984, 2.

¹²⁹ “Today’s Drugs: Treatment of Acute Poisoning: 1,” *BMJ* 2 (1964): 927-929.

¹³⁰ Leslie Charteris, *Trust the Saint* (London: Hodder and Stoughton, 1962).

¹³¹ C.J. Polson, “The Role of the Pathologist,” 203-210; “Tent of Death”.

the appearance of CT as a fictional murder weapon shows that tensions regarding utility and lethality were perceived.

Fortunately, CT seems only to have been used in anger against plants, rather than to deliberately harm other people. A local flower show in Macclesfield came to national attention in 1947 when one of the competitors found the chrysanthemums he had been growing for the occasion had been poisoned by CT fumes.¹³² The gardener suspected sabotage from a chemically knowledgeable opponent, as the victimised competitor claimed that chrysanthemums are uniquely susceptible to CT vapours. CT was described as an “everyday chemical” which was widely used in the town’s silk industry, but the article did not mention any domestic uses of the chemical.

Despite the scope for poisoning people and chrysanthemums, there was barely any discussion until the very late 1980s about the potential for environmental problems related to CT. British newspapers or magazines neither called for, nor supported or bemoaned the proposed removal of CT products. On the other hand, CT’s disappearance from domestic products – for instance, from novelty lava lamps – was occasionally newsworthy.¹³³ Although CT was singled out as a more powerful ozone depleting substance than any of the chlorofluorocarbons (CFCs) covered by the Montreal Protocol, the treaty that came into force in 1989 to protect the ozone layer, CT’s domestic uses were not mentioned. When CT was classed as an environmental pollutant in Britain, it was only ever in terms of industrial, rather than domestic use.¹³⁴ Although industrial-scale uses dwarfed the volumes used domestically, ignoring the impact of domestic users’ choices in the wider world was characteristic of environmental attitudes between the 1930s and 1980s.

This case study has illustrated CT’s transition from a chemical that was used professionally by hairdressers and dry cleaners, to one that was also used in the domestic sphere. The chemical provided an alternative to flammable grease solvents such as petrol. Thawpitt was sold at many outlets, conveniently picked off the shelf, without the need to interact with a retail chemist as they decanted and labelled CT.

¹³² “Prize Flowers Poisoned,” *DM*, 03 November 1947, 3.

¹³³ “‘Glitter’ Chemical Banned,” *TG (1959-2003)*, 14 August 1979, 2.

¹³⁴ Debora MacKenzie, “Substitute CFCs Will Stoke Global Warming,” *New Scientist* (13 May 1989): 25; Paul Brown, “Chemicals in Water Linked to Harwell,” *TG*, 23 March 1990, 3.

Another benefit of buying a branded product such as Thawpit was that it came with instructions on how to use it, whereas a bottle of CT from a chemist did not. However, surveys of Thawpit users and non-users did not identify unbranded CT as a main competitor, indicating that Thawpit users did not switch to cheaper, unbranded CT from the chemist once they learned how to use Thawpit. When CT and the commercial products based on it were withdrawn, British users were indifferent, which was to be expected when there were so many alternative, well-publicised products and methods at their disposal.

Conclusions

Users shared their experiences of buying and using chemicals in the press and used this platform to question products. Companies employed market research to gauge user needs and practices. Their research revealed that users were interested in effectiveness and value for money, and it was not unusual for users to be ignorant of the safety benefits of their choice or to use the product in a way that made it unsafe. As to concerns for long-term domestic and global environmental consequences of product choices, they arrived so late on the consumer scene in Britain that they have not been reviewed in this chapter, which has meant that discussion on chemical hazards has focused on acute poisoning and asphyxiation.

Nevertheless, this chapter has demonstrated that there was little demand from users for greater regulation, despite repeated serious accidents such as burns from caustic soda and fatalities following the inhalation or ingestion of CT. The chemicals chosen for these case studies did not stimulate any dedicated safety education campaigns about household chemicals in general. The abuse of volatile solvents was the exception, and will be discussed in Chapter 6. When concern about chemicals in the home was raised, it was for unsupervised children, rather than the composition of commercial household cleansers. Adult users were considered able to take reasonable precautions.

The lack of clarity about which chemicals were the active ingredients of branded products appears not to have been an issue among most users, for whom the function was more important. Users were capable of deciphering shorthand warnings such as “not to be taken”, even when the consequences were not spelled out. Users took cues

and made assumptions from the product's function as well as packaging and labelling: a product for washing up or laundering should be suitable to immerse hands in. It was in the interest of the manufacturing company making a product that users could be expected to use it comfortably, but how they established this is not commented on in company histories. On the whole, domestic users knew and accepted that certain chemicals such as caustic soda could be harmful when kept or employed carelessly. However, users were not always clear about exactly how cautious they should be, or why, seen for example with the requirement to use CT in a well ventilated space.¹³⁵

Although despairing users interpreted warnings as cues for misuse and were particularly hard to control, other user behaviours could be tackled through packaging. Packaging became a key feature in the successful use and indeed appeal of commercial products, such as Carbosil's pouring packet and CT-based products' applicator tips, which directed or facilitated users' behaviours. When unrestricted by packaging design, as was the case for benign soda crystals, users were conceptually and linguistically constrained by the common name, washing soda.

Unlike innocuous washing soda, CT could be harmful when misused. Nevertheless, in some situations CT and Thawpit were safer than, for example, a flammable grease remover such as petrol. The noxious vapours of CT could be dealt with by working in a well ventilated space, although the user still had to take care not to knock over and spill the bottle of volatile solvent. This problem was dealt with in the 1960s through packaging design. A bottle of Thawpit could therefore be safer than a bottle of CT from the chemist because its applicator top prevented spills if it was knocked over. However, protecting users was not an altruistic act on the part of the manufacturers. By making products that were not classified as poisons, they could be sold without restriction even if they were potentially harmful, like Thawpit was. Instructions for use and safety were incorporated into branded packaging, divesting responsibility for delivering information from the vendor to the user. Additionally, branded packages were convenient for shopkeepers to stock. From the user's point of

¹³⁵ Valerie Taylor and Amanda Bower, "Improving Product Instruction Compliance: 'If You Tell Me Why, I Might Comply'," *Psychology & Marketing* 21 (2004): 229-245.

view, choosing branded commercial cleaning preparations over unbranded chemicals can be understood as a safety precaution.

The frequency of use and the volume of chemical or product required are relevant factors when considering why chemicals were or were not used at home. In Carbosil adverts, the neatly packaged product was portrayed as an advantage over bulky, ordinary soda crystals and therefore a reason for choosing Carbosil. Other chemicals, such as CT, were less frequently required. The next chapter discusses chemicals that were used infrequently, in fact seasonally. Gardeners used herbicides during the spring and summer, when weeds were emerging and growing fastest.

ⁱ "Spots and Stains," *MG*, 15 June 1927, 8.

ⁱⁱ Isabella Beeton, *Mrs. Beeton's Hints to Housewives; with Sections on Labour-Saving, Household Work, Servants' Duties, Shopping, Table Service, Etiquette, and First Aid*, (London: Ward, 1928), 41.

ⁱⁱⁱ Alexander Duckham, "Removing Stumps of Oaks," *TT*, 28 July 1930, 18.

^{iv} "Dandelions," *MG*, 01 July 1936, 8.

^v "An Antirrhinum Menace: How Gardeners Should Combat It," *MG*, 21 March 1936, 12.

^{vi} "Miscellany," *MG*, 26 February 1930, 9.

^{vii} "The Monster: A Kitchen Transformation," *MG*, 02 November 1932, 6.

^{viii} "Infested New Houses: Salford's Measures National Campaign Possible," *MG*, 12 December 1933, 13.

^{ix} "Vacuum Flasks," *MG*, 16 June 1932, 6.

^x "Science and Housekeeping: Some Small Points," *MG*, 27 August 1935, 6.

^{xi} *Ibid.*

^{xii} "Iodine Stains," *MG*, 10 July 1933, 6.

^{xiii} "'Jews Keep out' Sign on Links," *Daily Express*, 11 July 1938, 1.

^{xiv} "Mantlepiece Stains," *MG*, 08 November 1934, 8.

^{xv} "Scorch Marks," *MG*, 22 February 1934, 6.

^{xvi} "Saving Fuel," *MG*, 21 September 1939, 4.

^{xvii} Caroline Davidson, *A Woman's Work* (London: Chatto & Windus, 1982), 98.

^{xviii} "Cooking Economies," *MG*, 02 November 1939, 4.

^{xix} "Economies in the Kitchen," *MG*, 24 July 1940, 3.

^{xx} "Health and the Household," *Taunton Courier and Western Advertiser*, 05 November 1938, 13.

^{xxi} "Reducing the Effect of Poison Gases," *TT*, 07 January 1935, 9.

^{xxii} "Summer Stains," *MG*, 22 May 1935, 6.

^{xxiii} "Stockings," *MG*, 13 June 1935, 6.

^{xxiv} "Washday Hints," *MG*, 30 June 1937, 8.

^{xxv} "The Garden in August," *MG*, 23 July 1938, 8.

-
- xxvi "Stocking A.R.P. Larder," *MG*, 14 July 1939, 15.
- xxvii "The Ministry of Food," *TT*, 06 November 1941, 7.
- xxviii "The Ministry of Food," *TT*, 04 April 1944, 3.
- xxix Alison Settle, "Women and the Raids," *The Observer*, 06 October 1940, 2.
- xxx "The Manchester Assizes: A Lover's 'Brutal Revenge'," *MG*, 24 April 1940, 10.
- xxxi "Imperial Chemical Industries Limited," *TT*, 27 June 1941, 3.
- xxxii <http://www.bbc.co.uk/news/uk-scotland-edinburgh-east-fife-22775253> (accessed 03 March 2014).
- xxxiii "Winter Spraying: Fruit and Other Trees," *MG*, 30 November 1940, 5.
- xxxiv "Any Questions?" *BMJ* 1 (23 April 1949): 734-36.
- xxxv "Put Caustic Soda in Fish Tanks," *MG*, 27 Nov 1953, 4.
- xxxvi E. Harris, "Chilblain Treatment," *Derby Daily Telegraph*, 19 January 1950, 5.
- xxxvii Alma Chesnut Moore, *How to Clean Everything: An Encyclopedia of What to Use and How to Use It* (London: T. Werner Laurie Ltd, 1954), 43.
- xxxviii A "Practical Householder" *Handbook* (London: George Newnes, 1962).
- xxxix "New Lines," *TG*, 15 April 1963, 4.
- xl Hilary Gelson, "Cool Calm and Collected," *TT*, 09 July 1970, 8.
- xli Sarah Boseley, "Blackmailers Spiked Baby Food," *TG*, 27 April 1989, 1.
- xlili James Erlichman, "ICI Admits Green Labels Were Wrong" *TG*, 07 June 1990, 2.

Chapter 4: Gardening

Between the 1930s and the 1980s, gardeners were able to turn to chemicals and branded chemical products in order to control weeds and unwanted insects and fungi to help their vegetables, fruits, lawns and decorative plants flourish. Weeds are considered to be any unwanted plant that competes with cultivated plants for space, light, water and nutrients, and gardeners could also use household chemicals already at their disposal, such as washing soda and caustic soda (Table 3.1, Chapter 3). For advice on this, and on identifying and eliminating pests and weeds gardeners could consult a range of sources, not just specialised gardening publications.

Advice on pests and weeds

Compendiums of domestic advice included details on weeding and garden pest control, especially when food for the household was grown in the garden. Growing food became necessary as a result of food rationing and reduced manpower during war time, then later, due to rising costs of living.¹ Gardeners' attention to the need to weed and protect against pests was seasonally called on by newspaper gardening columns and magazines such as *Amateur Gardener* and *Practical Gardening*, as well as broadcasts on radio and television. Every growing season was marked by calls for vigilance and defence against destructive pests and competitive weeds, while each autumn and winter gardeners were instructed to take preventive measures to protect their fruit trees, such as applying caustic washes. Reference books that were endorsed and published by authoritative sources such as the Ministry of Agriculture and Fisheries, later the Ministry of Agriculture, Fisheries and Food (MAFF), and the British Crop Protection Council, as well as the Royal Horticultural Society (RHS), contributed to the belief that chemical weed and pest control was something that was necessary and should occur in the domestic garden.² The focus on food production stemmed from the emphasis that

¹ *The Harpic Home Book* (London: Harpic Manufacturing Company 1928), 115-122; Charles Quest-Ritson, *The English Garden: A Social History* (London: Penguin, 2001), 251-252.

² MAFF, *Chemicals for the Gardener: For the Control of Plant Pests, Diseases and Weeds* (London: HMSO, 1965); G.W. Ivens and J. Stubbs, *Plant Protection in the Garden* (London: The British Crop Protection Council, 1990); Richard Chancellor, *Weed Control in the Garden* (London: Cassell, 1988).

governments placed on the capacity to grow food at home during both world wars, but also from the fact that the agrochemical industry offered industrialised methods of agriculture to gardeners for use in their home gardens.

Gardening magazines in the 1920s and 1930s brimmed with adverts for branded chemical preparations to assist gardeners in their battles against weeds and insects, although these adverts dwindled by the 1960s and 1970s in favour of objects to decorate and furnish the garden. This change was connected to a shift from physically demanding to low maintenance gardens, a change which can be seen in book titles from the 1970s, such as the “no-work” garden, where using mulch avoided the effort of repeatedly hoeing or applying chemicals to destroy weed seedlings.³ Nevertheless, chemicals have remained a way of reducing labour, as Robert Schery’s chemically intensive methods to attain “a perfect lawn the easy way” indicates,⁴ and although magazine adverts for garden chemicals declined, this reduction has been matched neither by a decrease in content recommending chemicals, nor in the purchase of such chemicals. Garden sheds of chemical-minded gardeners were described in the 1960s as looking like laboratories with their rows of bottles, tins, powders and liquids.⁵ By the late 1970s there were over 200 branded chemical preparations available for amateur use in the domestic garden, and these chemicals were regulated by an industry-led, consumer-focused regulatory system, overseen by MAFF. In this chapter I examine only a small selection of these chemicals and products, with case studies of two chemicals: sodium chlorate and paraquat.

Although British gardeners’ annual expenditure on chemicals suggests that weeds were of less concern than insects or fungal pests,⁶ I chose to focus on herbicides in this chapter because they were associated with the practices of weeding, which were characterised as back-breaking and tedious, and allow me to consider labour in the home, a theme that runs throughout this thesis. There are fascinating stories yet to be told about the domestic chemical control of insects because academic interest, in DDT

³ Ruth Stout and Richard V. Clemence, *The Ruth Stout No-Work Garden Book* (Emmaus: Rodale Press, 1971).

⁴ Robert W. Schery, *A Perfect Lawn the Easy Way* (London: Collier Macmillan Publishers, 1973).

⁵ Stan Russell, “Laboratory Gardening,” *Practical Gardening*, April 1964, 3.

⁶ Stan Russell, “Over the Fence,” *Practical Gardening*, February 1976, 5.

for example, has concentrated on the discovery and manufacturers, and only fleetingly included domestic users.⁷ However, herbicides were implicated in more numerous acute poisonings than insecticides or fungicides, so presented a real source of immediate hazard to the user and others who shared the garden. This element of risk, created in the garden by the presence of chemicals, therefore makes herbicides a good choice for my case studies.

Sodium chlorate and paraquat were used to kill weeds in paths and cultivated beds, respectively. Not only were these two chemicals used for distinct purposes, but they entered the market at different times: sodium chlorate arrived on the market in the 1930s, followed by paraquat in the 1960s. Both chemicals were initially used in agriculture before becoming available to domestic users. Domesticated products designed for amateurs delivered the advantages of effective herbicides used by professionals without the disadvantages of handling concentrated and potentially dangerous chemicals. Sodium chlorate was embraced in the 1930s for its long-term suppression of weeds and was always referred to by its chemical name whether or not it was also associated with a brand. Paraquat “starred” as the active ingredient in branded products made by a very limited number of manufacturers (all subsidiaries of Imperial Chemical Industries [ICI]). The common chemical name, paraquat, dominated discussions of the products, rather than its full chemical name, 1,1'-dimethyl-4,4'-bipyridylium, or its brand names: Gramoxone for professionals and Weedol for home gardeners. Misuses of sodium chlorate and paraquat led to both these chemicals facing restrictions on sale, before further concerns about safety led to total bans of their use within the European Union in the 2000s, outside the scope of this study.

Between the 1930s and the 1980s, gardens belonging to all classes of user were increasingly designed and used as outdoor rooms.⁸ The relocation of the toilet from an outdoor privy to inside the house meant that the outdoor space, be it a yard or a

⁷ Peter Morris, “A Tale of Two Nations: DDT in the USA and the UK,” in *Hazardous Chemicals: Agents of Risk and Change (1800 - 2000)*, ed. Elisabeth Vaupel and Ernst Homburg (Oxford: Berghahn Books, forthcoming); Paul Robbins, *Lawn People: How Grasses, Weeds, and Chemicals Make Us Who We Are* (Philadelphia: Temple University Press, 2007), 52-58.

⁸ Mark Bhatti and Andrew Church, “‘I Never Promised You a Rose Garden’: Gender, Leisure and Home-Making,” *Leisure Studies* 19 (2000): 188; Alison Ravetz and Richard Turkington, *The Place of Home: English Domestic Environments, 1914 - 2000* (London: E & FN Spon, 1995), 194.

garden, was freed from this association and was thus extended.⁹ Paving was easily maintained, patios could be for *al fresco* dining, gardens were places for children and pets to play, and for families to relax and connect with nature in a pleasurable space that was perhaps coloured, scented and textured by plants. At the same time, gardens remained functional, as a place to grow food for the family and a place to dry the washing.¹⁰ The garden has been studied as a gendered place where men have made space for themselves in the home and their physical strength suited heavy digging on vegetable plots, operating machinery and sprayers.¹¹ Yet the garden is a place where women have exercised aesthetic prowess and nurtured an outdoors domestic environment.¹²

However, despite the occasional mention of “sprays” in studies on gardening, neither chemical use nor weeding have been assigned to one particular gender, which is indicative of shared and negotiated work in the garden. Weeds have been described as “offensive” by both men and women:¹³ the aesthetically displeasing vegetation was not simply out of place or competing with treasured blooms, but also a threat when the roots and tendrils pried and lifted paving, even roofs and walls.¹⁴ Gardening, and especially weeding, has been bound up in ideas of control and power over one’s domain, with weeds and other pests portrayed as enemies to be constantly battled into submission through sustained labour and toxic chemical applications. In this way, the supposed peace and security of a domestic garden has been transformed into a site of masculine violence.¹⁵ By way of contrast, some non-users of garden chemicals have

⁹ Ravetz and Turkington, *The Place of Home*, 178.

¹⁰ *Ibid*, 190-194; Mark Bhatti and Andrew Church, “Cultivating Natures: Homes and Gardens in Late Modernity,” *Sociology* 35 (2001): 48-49;

¹¹ Lisa Taylor, *A Taste for Gardening: Classed and Gendered Practices* (Oxford: Routledge, 2016), 17, 66, 144; Jayne Raisborough and Mark Bhatti, “Women’s Leisure and Auto/Biography: Empowerment and Resistance in the Garden,” *Journal of Leisure Research* 39 (2007): 462-463.

¹² Raisborough and Bhatti, “Women’s Leisure and Auto/Biography,” 459-476; Taylor, *A Taste for Gardening*, 26.

¹³ Bhatti and Church, “‘I Never Promised You a Rose Garden’,” 192, 194.

¹⁴ Stephen Williams, *Outdoor Recreation and the Urban Environment* (London: Routledge, 1995); Carol Kurrein, *The Flymo Book of Garden Games & Lawn Leisure* (Newton Abbott: David & Charles Publishers plc, 1989).

¹⁵ Ravetz and Turkington, *The Place of Home*; Robbins, *Lawn People*; Ursula Buchan, *A Green and Pleasant Land: How England’s Gardeners Fought the Second World War* (London: Hutchinson, 2013).

expressed a desire to live in harmony with nature, which writer on radical gardening George McKay links to a total world view that is not predicated on conflict and domination.¹⁶

For those who did not tolerate sharing their garden with weeds, weedkillers were experimentally compared to man-hours spent handweeding in 1939.¹⁷ Products advertised in the 1930s referred to weeding as “troublesome and expensive”, or “costly and backaching”.¹⁸ Notions of cost depend on who is looking at the problem because, for the working class gardeners that Margaret Wiles wrote about, the absence of chemicals in their routines can be interpreted as the outcome of no spare money in the household budget.¹⁹ Nevertheless, adverts that depicted the effort of weeding as uncomfortable and expensive, suggested that this work was sometimes paid for in terms of manual labour. Hired hands in the garden have not received the same scholarly attention as those inside the house,²⁰ possibly because other than in stately homes, help was required infrequently, and the work was often carried out by the householders themselves. Historian Steven Constantine’s view of middle-class gardening was that, from the 1850s, magazines for amateurs promoted gardening as a predominantly do-it-yourself (DIY) activity, and that gardening was taken up as a gently active, restorative pastime.²¹ A 1959 survey confirmed this DIY appeal when it revealed that only three out of every 100 gardens were tended by paid gardeners.²² Caring for the garden, including

¹⁶ George McKay, *Radical Gardening: Politics Idealism & Rebellion in the Garden* (London: Frances Lincoln Limited, 2011), 41.

¹⁷ “The Lawn in Early Spring,” *TT*, 13 February 1939, 19.

¹⁸ “Sofnol Advertisement,” *Amateur Gardening*, 09 June 1934, xx; “Abol,” *Amateur Gardening*, 23 June 1934, 1.

¹⁹ Williams, *Outdoor Recreation*; Margaret Wiles, *Gardens of the British Working Class* (New Haven: Yale University Press, 2014).

²⁰ Lucy Delap, “Housework, Housewives and Domestic Workers: Twentieth-Century Dilemmas of Domesticity,” *Home Cultures* 8 (2011): 189-210.; Tessa Boase, *The Housekeeper’s Tale* (London: Aurum Press, 2015); Selina Todd, “Domestic Service and Class Relations in Britain 1900-1950,” *Past & Present* 203 (2009): 181-204.

²¹ Stephen Constantine, “Amateur Gardening and Popular Recreation in the 19th and 20th Centuries,” *Journal of Social History* 14 (1981), 387–406.

²² Ravetz and Turkington, *The Place of Home*, 187.

weeding, has also been a way of caring for oneself, of taking time to be quiet, when weeds can be an appropriate focus for anger.²³

Chemicals were therefore incorporated into caring for the garden and oneself, because adverts encouraged potential users to think of chemicals in terms of their time and physical effort. Using garden pesticides was also portrayed as a patriotic duty, especially with regard to protecting food crops during wartime. *Dig for Victory* leaflets, Ministry of Food exhibitions, and short films depicting the “Blitz on Bugs”, called on gardeners to tackle pests and stop weeds taking nutrients needed by fruits and vegetables.²⁴

Once the deprivations of war were over, neither the language nor imagery of battle and protection were abandoned, but the use of gardening chemicals was increasingly described as making the activity more leisurely. Chemical use could even be incorporated into the structure of gardens when designers considered easier herbicide application as an important part of a labour-saving garden, so made paths that could be treated without the weedkiller spreading to non-target areas.²⁵ This example of planning ahead demonstrates that garden chemical users calculated how their leisure time could and should be spent.

Although gardeners were in control of whether they used chemicals, they could not use whichever chemical they fancied. The range of chemicals available to domestic gardeners was limited by the Pharmacy and Poisons Act 1933. Retailers had to be registered to sell products included in the Poisons Rules, and discern who could properly buy the poison, then record their details. Arsenical pesticides and weedkillers, for instance, were controlled by the Poisons Rules, and they remained available to home gardeners into the 1980s. British gardeners did not enthusiastically take up arsenic-based domestic products, despite their effectiveness. The early implementation of maximum arsenic residue levels on agriculturally produced food crops publically raised the issue of risks associated with domestic arsenic use.²⁶ Additionally, arsenic’s

²³ Mark Bhatti et al., “‘I Love Being in the Garden’: Enchanting Encounters in Everyday Life,” *Social & Cultural Geography* 10 (2009): 68.

²⁴ Buchan, *A Green and Pleasant Land*.

²⁵ Claire Glasspoole, “25 Labour Saving Ideas,” *Practical Gardening*, November 1966, 31.

²⁶ Susan Lanman, “Colour in the Garden: ‘Malignant Magenta’,” *Garden History* 28 (2000): 211.

association with accidental or deliberate poisoning made gardeners wary of the chemical. Indeed, poisoning with arsenical weedkiller was a staple of Agatha Christie novels,²⁷ cementing such misuse of domestic chemicals into the popular imagination. Hence, the use of arsenicals was not widely recommended in the pages of gardening advice and other less feared products, such as sodium chlorate, readily displaced them.

However, non-arsenical products were not necessarily safe, and in the 1950s, agrochemicals were linked to large-scale and widely discussed wildlife deaths, a topic that worried the British public at least as much as that of human deaths,²⁸ which also occurred at that time. Subsequently, the voluntary, industry-regulated Pesticides Safety Precautionary Scheme (PSPS) was set up in 1957 and operated in close contact with MAFF. The Pesticides Advisory Committee²⁹ (PAC), as well as the Poisons Board examined, then discussed, technical reports and proposals for new chemical products with company spokesmen.

The committees were composed of experts in pathology and toxicology, practised in examining technical, scientific documents and thinking about risks. Users were not represented, instead they were simply imagined by committee members, based on their own knowledge and experiences. It is worth noting that the scheme, which was initiated in response to increasing awareness of consumer rights to safe products and relevant information, did not involve consumer groups or union representatives. This situation was not challenged until the 1980s, when unionised forestry and agriculture workers (unsuccessfully) demanded that an expert committee must include the users themselves, not just specialists familiar with the effects or mechanisms of action.³⁰

As many of the garden chemicals used at home were the same as, or closely related to, products used in industrial-scale agriculture, the impact of the PSPS scheme

²⁷ Agatha Christie novels containing weedkiller related deaths: *The Cornish Mystery* 1923, *How does your garden grow* 1935, *Dumb Witness* 1937.

²⁸ Brendan Gillespie, "British 'Safety Policy' and Pesticides," in *Directing Technology*, ed. Ron Johnston and Philip Gummatt (London: Croom Helm, 1979), 202-224; John Clark, "Smarden's Silent Spring, 1963: Pesticides, Pollution and the Growth of British Environmentalism," in *ICSHTM* 2013, Manchester, 2013.

²⁹ Initially this group was called the Advisory Committee on Poisonous Substances Used in Agriculture and Food Storage, which was later renamed the Advisory Committee on Pesticides and Other Toxic Chemicals. For brevity it was referred to as the Pesticides Advisory Committee (PAC).

³⁰ John Matthews, "Unions Press for Herbicide Ban," *New Scientist*, 21 February 1980, 558.

on domestic users was to assure them that the new chemicals arriving on the market could be relied on to be effective and safe, provided the carefully worded precautions were followed.³¹ The warnings and instructions for use were scrutinised as part of the PSPS process because appropriate information reduced the likelihood of accidents.

Although better labelling made getting relevant information easier, this fact was largely ignored in the press and in private diaries. Neither was there any sudden improvement in domestic gardeners' ability to use chemicals more safely, nor was there a dramatic reduction in accidents or misuse. Gardeners had been able to glean useful details from other places, such as journals and magazines, so were not necessarily ignorant or ill-informed. The dissatisfaction with labelling that was seen in frustrated gardeners' improvisations, which they shared in magazines such as *Practical Gardening*, confirmed that the users themselves wanted clear, informative labelling on chemical packaging. This desire was not considered met, generally due to the diminutive font necessitated by the small size of the product. In Figures 4.1 and 4.2, user unfriendly labelling was shown to have been addressed by attaching larger labels³² or by creating ready reference dosage charts for their selection of garden chemicals.³³ What is striking about these examples of labels is that, while Government targeted safety, the gardeners focused on personal efficiency.

Figure 4.1 shows that the information that gardeners wanted to see clearly and quickly was for dosage, not personal safety. Users could take care of safety themselves, for instance by using dedicated spoons (Figure 4.2) to avoid contaminating kitchen equipment. The problems that gardeners tried to fix were not ones that could be addressed by parliamentary acts. Irritations such as these became, as Stebbins suggested in his study of hobbies, opportunities for gardeners to creatively solve problems.³⁴ This positive attitude to problem solving was not evident in Chapter 3 and reveals a difference in the way that housewives and gardeners viewed and interacted

³¹ *Chemicals for the gardener: for the control of plant pests, diseases and weeds* (MAFF, HMSO, 1963).

³² P. Ridler, "Clearer Labels," *Practical Gardening*, December 1966, 5.

³³ E. Rudd, "Dosage Chart," *Practical Gardening*, April 1964, 43.

³⁴ Robert Stebbins, *Leisure and Consumption: Common Ground/Separate Worlds* (Basingstoke: Palgrave Macmillan, 2009), 17-20.

with their chemicals. Having discussed some general concerns with garden chemicals, I now move on to the first of two case studies, sodium chlorate.

This figure had been removed due to copyright restrictions

Figure 4.1: A reader of Practical Gardening remedied the illegibly small instructions on chemical packaging (December 1966).

This figure had been removed due to copyright restrictions

Figure 4.2: A Practical Gardening reader's suggestion to keep appropriate dosing equipment and instructions available (April 1964).

Sodium chlorate

When environmental historian Clinton Lorne Evans wrote about the grasslands of Canada and North America, he claimed that the herbicidal properties of sodium chlorate were known from 1904, though not systematically investigated until the 1920s.³⁵ The first manufacturer to market the chemical as a herbicide was Chipman Chemicals, which was based in New Jersey. From 1926, they promoted a sodium chlorate and calcium chlorate mixture to American farmers, which they called Atlacide. The company outlined the pedigree of Atlacide, saying that it was a powdered form of an older product line of theirs, the famous Atlas non-poisonous weedkiller. How much this influenced British gardeners is unclear, as the name Atlas did not appear in my research. In Britain, the organisation was represented by an affiliated company, Chipman Chemical Company Ltd.³⁶

It was not until the 1930s that sodium chlorate was used on an industrial scale by British farmers for clearing land of ragwort, a plant poisonous to livestock, as part of

This figure had been removed due to copyright restrictions

Figure 4.3: A worker sprays herbicide at the tracks from a Chipman Chemical Co Ltd carriage in 1955. © National Railway Museum / Science and Society Picture Library.

³⁵ Clinton Lorne Evans, *The War on Weeds in the Prairie West: An Environmental History* (Calgary: University of Calgary Press, 2002), 154.

³⁶ *Ibid*, 157.

pasture renovation. British newspapers which reported on farming publicised this development, citing research done in Scotland.³⁷ Chipman's biggest customers in Britain were railway companies, who were anxious to stop weeds from congesting the rails and undermining the transport infrastructure (see Figure 4.3).³⁸ Sodium chlorate was especially suited to use on railways because a single application suppressed weeds for more than six months, greatly reducing labour, as profiled by *The Times* in 1937.³⁹

Following these large-scale industrial uses, gardening manuals, magazines and newspaper advice columns began to suggest that gardeners could use sodium chlorate to kill isolated weeds in garden lawns. Sodium chlorate's long-lasting herbicidal power meant that it was singled out as particularly effective for clearing weeds from paths, drives and other hard landscaping which the user wanted to keep barren. However, these titbits of advice were not very helpful because they did not tell users which stockists carried sodium chlorate, whether it had any proprietary names, nor any details about how best to use the weedkiller.

Although sodium chlorate was a strong, long-lasting weedkiller, it was non-poisonous under normal circumstances of use. Sodium chlorate was therefore quickly seized on as a harmless alternative to arsenical weed-killers "of evil repute".⁴⁰ However, if sodium chlorate was ingested, it was poisonous and caused unique physiological changes that allowed the chemical's involvement to be confirmed after death.⁴¹ Nevertheless, Chipman and other manufacturers assiduously promoted sodium chlorate as non-poisonous. An example of how protective Chipman was about sodium chlorate's safety can be seen in the company representative T.H. Thatcher's correction of a journalist who described the chemical as a poison. His letter to the editor was published by *The Times* and delivered a lesson on sodium chlorate's benefits.⁴² Chipman did not

³⁷ "Farming Notes and Comments," *TT*, 19 January 1931, 18.

³⁸ "Corporate Profile: Warren H. Moyer," *Journal of Agricultural and Food Chemistry* 3 (1955): 362-63.

³⁹ "Killing Weeds at 28 M.P.H.," *TT*, 16 August 1937, 7.

⁴⁰ "Garden Notes," *TT*, 09 July 1932, 13.

⁴¹ C.J. Polson, "The Role of the Pathologist in the Investigation of Fatal Poisoning," *Medicine, Science and the Law* 5 (1965): 204.

⁴² T.H. Thatcher, "Weed Killing on Railways," *TT*, 19 August 1937, 8.

attempt to reach British domestic users by advertising Atlacide at this time, but sodium chlorate promotion was taken up by the National Allotment Society (NAS).

A series of articles in the NAS journal between 1934 and 1935 which encouraged members to keep their plots tidy, advocated the use of sodium chlorate as the answer to weedy paths and unkempt areas.⁴³ As a result, the organisation claimed to have received requests for more information about this wonderful weedkiller and letters from disappointed gardeners unable to obtain it.⁴⁴ Having generated demand for the chemical, NAS became suppliers. In 1935 NAS arranged for sodium chlorate to be packaged in quantities appropriate for domestic use, which they made available through their existing seed and equipment business, National Horticultural Supplies.⁴⁵

The NAS journal referred to sodium chlorate as a “foreign product”⁴⁶ which suggests that the chemical was imported to Britain. This hypothesis fits with historian Peter Reed’s study of the United Alkali Company (UAC), whose production of sodium chlorate was closely linked to explosive manufacture during World War One. When the demand decreased after the war, UAC closed many of their plants.⁴⁷ These closures left Albright & Wilson’s hydroelectric powered plant based at Niagara Falls as the dominant producer of sodium chlorate globally.⁴⁸

As suggested by the chemical’s role in explosives manufacture, sodium chlorate was associated with accidental fires, which since its introduction as an agricultural herbicide had claimed a number of lives.⁴⁹ Therefore, NAS explained how to manage this danger. Gardeners were advised to rinse any chlorate impregnated items in clean water, an easily followed and common-sense instruction which reduced the fire risk.⁵⁰ NAS

⁴³ “Attractive Allotments and the National Scheme,” *National Allotments Journal* (1934), 10-12.

⁴⁴ “A Wonderful Weed-Killer (Continued),” *National Allotments Journal* (1935), 19-21.

⁴⁵ *Ibid.*

⁴⁶ “Attractive Allotments and the National Scheme”.

⁴⁷ Peter Reed, “Making War Work for Industry: The United Alkali Company’s Central Laboratory During World War One,” *Ambix* 62 (2015): 72-93.

⁴⁸ Hugh Podger, *Albright & Wilson: The Last 50 Years* (Sudley: Brewin Books Ltd, 2002), 15. This was known as the Oldbury Electro-Chemical Company.

⁴⁹ James Watson, “The Significance of Mr Richard Buckley’s Exploding Trousers: Reflections on an Aspect of Technological Change in New Zealand Dairy Farming between the World Wars,” *Agricultural History* 78 (2004): 346-360.

⁵⁰ “A Wonderful Weed-Killer,” *National Allotments Journal* (1934): 17.

never mentioned Chipman's branded product, Atlacide, which incorporated calcium chlorate as a fire depressant, making it a far safer option than sodium chlorate alone.

Until NAS acted as an intermediary, dealing with industrial quantities and bulk importers on domestic users' behalf, sodium chlorate –either as Atlacide or any other preparation – was apparently unavailable to home gardeners. However, by 1939 Plant Protection Limited (PPL), a subsidiary of Imperial Chemical Industries (ICI), had taken on the distribution and promotion of Atlacide to domestic users. They placed small adverts in *The Times* every couple of days between March and June 1939 to raise the profile of the "safe chlorate" that could be used to "Dust away weeds from garden paths, hard tennis courts". Dusting away weeds sounded far less labour intensive than pulling or digging up weeds, so the adverts emphasised the ease with which the herbicide was used. Dusting also indicated the fact that Atlacide could be applied dry. This method avoided gardening clothes becoming soaked in sodium chlorate solution which could present a fire risk. PPL supplied Atlacide in sprinkler topped tins in three (unspecified) sizes priced at 1s 6d, 2s 9d, and 4s 6d to ironmongers and seedsmen.⁵¹ Boots, who called themselves "The Gardeners Chemist" quickly followed suit. Boots' sodium chlorate was sold under the plain chemical name, packaged in tins priced at 10½d for 1lb, or 14s for a 20 lb tin.⁵² Boots sodium chlorate was cheaper to obtain, at under a shilling for a pound of weedkiller, which suggests that suppliers such as NAS and Boots made their products available to gardeners without the fire depressant in order to make the herbicide affordable to domestic users. Although the products sold by NAS and Boots were potentially more dangerous to use than Chipman's Atlacide, users could take the simple precaution of rinsing out any chlorate saturated items.

⁵¹ "Gardening &C," *TT*, 24 March 1939, 1.

⁵² Display advertising, *DM*, 27 April 1940, 9.

The sprinkler topped tins of Atlacide and the large tins of sodium chlorate from Boots demonstrate the different ways in which gardeners could use the weedkiller. Within the containers were crystals like salt, which could be sprinkled directly out of the tin onto weeds, applied by hand (gloves tended not to be recommended), or the chlorate was dissolved in water before application using a watering can. Gardeners were free to use the crystals to make up a solution to their desired strength. Changing the concentration of sodium chlorate solution made it suitable to kill different types of weeds: stubborn deep rooted weeds were given the most concentrated treatment, and smaller annual or biennial weeds could be killed with a weaker solution.⁵³ In this way, the apparently crude, total and unselective herbicide gained a degree of flexibility and allowed the gardener freedom to use whichever strength or method of application would best suit their situation. Once sodium chlorate crystals proved popular with gardeners, manufacturers offered it in other convenient forms, such as a powder that was easier to both sprinkle and dissolve, and even a liquid concentrate. A 1981 advert for Cooke's sodium chlorate highlights that it was available in both liquid and powder forms (Figure 4.4).

This figure had been removed due to copyright restrictions

Figure 4.4: Cooke's sodium chlorate advert, Practical Gardening magazine, 1981.

This figure had been removed due to copyright restrictions

Figure 4.5: Bird's sodium chlorate advert, Practical Gardening magazine, 1966.

The adverts in Figures 4.4 and 4.5 clearly show that sodium chlorate was the chemical that was being sold to gardeners. The chemical was not given brand names, although each manufacturer imprinted their company name on the product. No users

⁵³ Stanley Whitehead, *Garden Weeds and Their Control* (London: J.M. Dent, 1949), 58.

were shown in Bird's advert, but they highlighted the non-poisonous nature of the chemical, whereas Cooke's did not, but their advert showed a man using a watering can to apply sodium chlorate. The advert text invited potential users to imagine clearing weeds from drives, paths and waste ground as well as to the pictured patio. The addition of fire depressants to Cooke's product was emphasised, as was the chemical's effectiveness and inability to harm the environment. Concern for the environment typically emerged in advertisements from the 1980s, when this angle was seen as one that could attract users.

Absent from these advertisements is the crowned "A" symbol, which would have communicated that a garden chemical had been approved by the PSPS. Sodium chlorate had been widely used since the 1930s so there was no need for these products to have gone through the PSPS. Garden chemical users had to navigate a complex landscape of chemicals and assurances, but in the case of sodium chlorate, the identity of the chemical was all they really required. These two adverts show that sodium chlorate was recognised by gardeners as a strong and long-lasting weedkiller, without recourse to a brand name.

The introduction of EC-wide standardised warning symbols in 1985 meant that the hazard of combustion was represented on the packaging by the icon for oxidising. Although the symbol was the chemically correct description of sodium chlorate's fire starting properties, the chemical had always been, and would continue to be, described to domestic users as inflammable. This discrepancy passed without public comment, perhaps indicating that gardeners did not mind this pedantry, so long as they were still able to purchase and use the chemical as they wanted. Both symbols represent flames (Figures 4.6 and 4.7 below), so even if a user did not fully understand the difference between oxidising and flammable, they were able to get the gist of the warning.



Figure 4.6: The icon for "flammable" (introduced 1967).



Figure 4.7: The icon for "oxidising" (introduced 1967).

Misuse: Bombs and Bangers

Although accidental fires were a hazard, the risk that was highlighted to gardeners far more frequently was sodium chlorate's propensity to seep into non-target areas. To reduce this possibility, gardeners were urged to consider the weather forecast, as well as notice which plants might come into range if rain caused the weedkiller to spread further.⁵⁴ Newspaper gardening columns warned that accidental damage to neighbours' plants was a distinct possibility, but the use of the herbicide to deliberately damage property does not appear to have been a large problem. Gardeners were shocked when a vandal targeted multiple gardens in a village,⁵⁵ but based on newspaper reports, professional sports facilities rather than domestic gardens appeared to be the target of unsolicited weedkiller use.⁵⁶ As seen in Chapter 3, caustic soda was also used to vandalise sports facilities by killing grass. Attacking public spaces would have had greater impact if the vandal wanted to make a political point, because the spectators as well as radio listeners at home, then an increasing number of viewers in the 1960s when

⁵⁴ "Weary Battle against the Weeds," *TT*, 21 March 1959, 9.

⁵⁵ "Garden Poisoner Injures Baby," *DM*, 01 July 1958, 5.

⁵⁶ "Police Rule out Cricket Tour Vigilantes," *TT*, 07 May 1970, 2; "Wrecker Poisons Golf Links," *DM*, 25 July 1960, 7.

television ownership and televised sports coverage expanded, would have been aware of the result.⁵⁷

Although vandalism using weedkillers was not a misuse that manufacturers could or were asked to address, creep and fire risks were undesirable features that were highlighted by both manufacturers and marketers to set their new products apart from sodium chlorate. By 1964, simazine-based products were recommended as preferable to sodium chlorate because they did not creep, nor were they associated with fires, and their effects were even longer lasting than sodium chlorate's. Nevertheless, sodium chlorate continued to be recommended and used when a relatively cheap and reliable long-term weedkiller was needed.

The oxidising property of sodium chlorate was not a principal concern to gardeners, but it was a preoccupation of government. In 1939, MI5 compiled a list of "Prohibited Chemicals",⁵⁸ which were chemicals believed to be sought after by those who posed a threat to national security, and included sodium chlorate. When in 1941 a German agent was found carrying instructions to go to chemists' shops and purchase bomb-making chemicals, including sodium chlorate, this validated MI5's list.⁵⁹ Government officials were not just concerned with shops, because they believed that would-be bombers might join horticultural or co-operative societies in order to access chemicals.⁶⁰ Although policy makers were aware of the potential role of allotment societies in distributing and facilitating access to sodium chlorate, no conclusive solution to this problem emerged.

Legitimate gardeners continued to be able to buy sodium chlorate despite the measures in place to monitor its sale. One pound of sodium chlorate was all that a person could buy at any one time, unless they had a police certificate. One pound of

⁵⁷ Golf coverage began on the radio in the 1920s, cricket in 1927 and on television from the mid 1950s (Geoffrey Cousins, *Golf in Britain* (London: Routledge and Keagan Paul, 1975), 120; Jack Williams, "Broadcasting and Cricket in England" Chapter 4 in *The Cambridge Companion to Cricket*, ed. Anthony Bateman and Jeffrey Hill (Cambridge: Cambridge University Press, 2011), 55; Robert J. Lake, *A Social History of Tennis in Britain* (Abingdon: Routledge, 2014), 207.

⁵⁸ "Precautions against Sabotage," (1939), in HO 144/23246, TNA; "Retail Sale of Certain Substances," (1942) in HO 144/23246, TNA.

⁵⁹ Gonne St Clair Pilcher, "Letter to Dr Watts," (19 March 1941) HO 144/23246, TNA.

⁶⁰ A.R. Bosanquet, "Chems. Letter to Explosives Dept from Chief Constable, Reading Borough Police," (1943) HO 144/23246, TNA.

sodium chlorate made a gallon of strong, 10% solution for treating deep rooted weeds, or four gallons of 2.5% solution for smaller annual weeds, so being limited to a pound should not have affected most domestic gardeners. Whether chemists complied or not with the surveillance programme, or chose to stop selling the product to avoid the trouble of paperwork, was their individual decision.⁶¹ The retailer had to fill out a lengthy form declaring the quantity sold and that the buyer was known to them, then return the form to be centrally processed. Being asked for an identity card, an address and the reason for the purchase may have been a deterrent to a customer, but the process mainly discouraged the vendor from selling the product at all. Suttons Seeds, which did much of its business through mail order, expressed concern because they could not properly describe their customers as “known” to them, and complained that the sheer number of buyers of chlorates and nitrates during spring meant that they would require an extra clerk to process all the paperwork. While most retailers did endeavour to complete this time-consuming process and numerous forms were received in the first year of implementing the scheme, the urgency and enthusiasm for this national duty waned, as shown by the decline in reporting.⁶²

By 1943, the threat of sabotage was declared lowered, and the reporting procedure was lifted on sodium chlorate and most of the other chemicals on the list. Neither the existence of the restrictions, nor any evidence of their implementation, was discussed in gardening magazines or in newspapers, suggesting that gardeners on the whole did not encounter any changes in the supply of their new favourite herbicide that were serious enough to complain or comment about. However, sodium chlorate may have been in short supply to civilians, as demonstrated by Plant Protection’s 1944 reassurance to their customers that “Atlacide – the safe chlorate weedkiller is on active service”.⁶³ Nevertheless, although domestic gardeners did not complain about the lack

⁶¹ “Extract from Minutes of Special Branch Conference (Regional) Held at Reading on 29 April 1943,” (1943) HO 45/11240, TNA.

⁶² *Ibid.*

⁶³ “Atlacide,” *TT*, 21 September 1944, 3.

of availability of sodium chlorate, the problem of inadequate supplies for agricultural use was regularly raised in Parliament between 1944 and 1948.⁶⁴

Government interest in sodium chlorate waned until accidents involving schoolboys initiated a renewed flurry of parliamentary activity. Between 1956 and 1966, 242 young people were injured by homemade explosives containing sodium chlorate.⁶⁵ Accidents most often occurred when children transported the bangers in their pockets, where friction caused premature ignition. Garden writers called for “serious investigation” into why such a potentially dangerous chemical could be bought in brown paper bags from any hardware shop or chemist without any warnings.⁶⁶ Yet garden writers had rarely noted that the chemical should be handled with care and continued to recommend its use as a herbicide. This discrepancy shows that an inherent, and largely ignored, distinction was being made between adults and children. In an adult gardener’s hands, sodium chlorate was assumed to be only a danger to plants, but in a child’s hands the chemical represented a danger to their body. As Chapter 6 discusses children and their interactions with other chemicals at home in more detail, here I will focus on sodium chlorate.

In 1961, the Home Office announced discussions with retailers to prevent sales to children,⁶⁷ and over the next two decades parliamentarians debated whether manufacturers could alter the formulation or delivery of the herbicide to prevent it from being used as an explosive, without affecting its ability to kill weeds.⁶⁸ Formulations which incorporated fire depressants had long existed, Atlacide for example, and liquid preparations did come on to the amateur market, though they were marketed as

⁶⁴ Oliver Crosthwaite-Eyre and Thomas Williams, “Sodium Chlorate,” HC Deb, *Hansard* (19 November 1945): vol 416, cc25-6; George Lambert and John Belcher, “Sodium Chlorate Supplies,” HC Deb, *Hansard* (05 July 1948): vol 453, cc11-2W.

⁶⁵ Emlyn Hooson, “Home made explosives (accidents)” HC Deb, *Hansard* (28 June 1966): vol 730, cc250-1W.

⁶⁶ “The Best Way to Keep Paths Free of Weeds,” *DM*, 13 June 1959, 8.

⁶⁷ Joseph Mallalieu and David Renton, “Sodium chlorate,” HC Deb, *Hansard* (21 December 1961): vol 651 c178W.

⁶⁸ Walter Loveys and Christopher Woodhouse, “Sodium Chlorate,” HC Deb, *Hansard* (07 February 1963): vol 671, cc644-5; Emlyn Hooson and Alice Bacon, “Sodium Chlorate,” HC Deb, *Hansard* (18 May 1966): vol 728, cc266-7W; Gwilym Roberts et al., “Fireworks (Accidents),” HC Deb, *Hansard* (13 February 1969): vol 777, cc1540-1; Sally Oppenheim and Gwilym Roberts, “Firework Accidents,” HC Deb, *Hansard* (31 October 1979): vol 972, cc538-9W.

convenient rather than to prevent fire. Some manufacturers eventually changed their formulation, such as ICI (parent company of Plant Protection Limited, PPL), who by 1970 advertised that their sodium chlorate weedkiller contained fire depressant.⁶⁹ This showed that the company were keen to avoid their amateur gardening products being connected with accidental fires and homemade bangers, not to mention deliberate explosions.

The focus of concern tended to be the protection of children who might use the chemical to make bangers, rather than adult, politically motivated explosive-makers. The implications for gardeners of adding fire depressant chemicals to the weedkiller,⁷⁰ were not discussed in gardening publications. Sodium chlorate was used for total, rather than selective weedkilling and was expected to be long-term. Consequently, any changes to the soil wrought by any new additives went unnoticed by the time the area was replanted. The gardeners' indifference towards the measures implemented by manufacturers to accommodate careless users and to deter misusers can be explained by the fact that the effectiveness of the herbicide did not change and all users benefitted from improved safety.

As an alternative to adding a fire depressant, another approach to prevent misuse was taken when, in May 1970, Boots sent a special announcement to all its shops, requesting that tins of sodium chlorate be displayed out of the reach of children. Labels which declared the product should "not be sold to children under 18" were to be affixed to each tin in stock (Figure 4.8).⁷¹ These actions show that Boots was serious about attempting to stop the sale of that chemical to young people, who were deemed particularly likely to use it for pyrotechnic purposes. Despite Boots' efforts to prevent sales to minors, their continued production of sodium chlorate weedkiller without a fire depressant⁷² was at odds with their sales policy. Although the sale of sodium chlorate to

⁶⁹ "May in the Garden with ICI," *DM*, 02 May 1970, 9.

⁷⁰ Health and Executive Safety, "Storage and Use of Sodium Chlorate and Other Similar Strong Oxidants," 1998, 7. http://qub.ac.uk/safety-reps/sr_webpages/safety_downloads/sod_chlorate.pdf (accessed 04 May 2017).

⁷¹ Boots Home & Garden, "Special Announcement: Sodium Chlorate," news release, 18 May 1970, Boots Archive.

⁷² British Agrochemicals Association, *Directory of Garden Chemicals*, Third ed. (London: British Agrochemicals Association, 1978).

children might have been difficult for government to control, obtaining an amount from a garden shed was even further beyond governmental influence than were sales. This supply route does not appear to have been discussed, nor were there any specific suggestions that adult gardeners should monitor or guard against their supplies being pilfered for use in bangers. This oversight is an example of a disjointed approach to examining risks in the home.

This figure had been removed due to copyright restrictions

Figure 4.8: Announcement sent to all Boots branches in 1970. ©The Walgreens Boots Alliance Archive.

More serious than schoolboys' bangers were the larger bombs made by political and other activist groups. In 1962, seven tins of sodium chlorate, equivalent to 100 hand grenades according to an explosives expert, was cited as evidence of a National Socialist Movement bomb plot.⁷³ The tightening of controls on commercial explosives after 1970

⁷³ "Nazi Salute" *DM*, 29 August 1962, 5.

resulted from an increased use of agricultural and horticultural chemicals to construct bombs. In 1970s Northern Ireland, the Irish Republican Army (IRA), Provisional IRA, Ulster Volunteer Force and Ulster Defence Association used sodium chlorate mixed with nitrobenzene to make filler for pipe bombs. It was also used as propellant (along with another household item, the J-cloth) for ammonium nitrate mortar bombs,⁷⁴ and as a component in delayed chemical ignition systems.⁷⁵ The explosives made using agricultural and horticultural chemicals were called homemade, although this moniker was used to convey that the materials were not purchased as ready-made military provisions.

Frequent high-profile bombings with sodium chlorate-based explosives carried out by paramilitary organisations in Northern Ireland led in 1972 to the imposition of restrictions on sales of the chemical in that region. Although the idea of restricted sales of sodium chlorate to prevent its use in terrorism was supported in principle, Westminster politicians also stressed their reservations about the effectiveness of this gesture. After all, the experience of the Prohibited Chemicals List had shown that shopkeepers were unwilling to take up the role of regulator. Enoch Powell called the attempt to control sodium chlorate sales “pathetic” and “unlikely to correspond with any of the hopes expressed in connection with it”.⁷⁶ Speaking in the House of Lords, Baron Charles Hale recalled his own experiences of making homemade fireworks and sodium chlorate’s unreliability, in his attempt to refocus attention towards the arguably more serious threat of systematic theft of commercial explosives and detonators from industrial sites.⁷⁷ The order was ineffectual and, despite arrests relating to unlicensed bulk transport of sodium chlorate, the chemical continued to be used in explosives throughout The Troubles.

Although calls for the addition of fire depressants to sodium chlorate had been prevalent during the 1960s when children were involved in small, accidental explosions,

⁷⁴ Tony Geraghty, *The Irish War: The Hidden Conflict between the IRA and British Intelligence* (Baltimore and London: JHU Press, 1998), 189.

⁷⁵ Robert Rodwell, “Army Uncovers a Mrs Beeton for Bombers,” *New Scientist*, 03 May 1973, 276-277.

⁷⁶ David Howell et al. “Northern Ireland (Control of Explosives),” HC Deb, *Hansard* (05 June 1972): vol 838 cc156-72.

⁷⁷ “Explosives Security”, House of Lords Debate, *Hansard* (06 November 1975): vol 365 cc1377-9.

greater adoption of fire depressants was not argued for when sodium chlorate was used in intensive political terrorism in the 1970s. Manufacturers do not appear to have been publicly called upon to help prevent this misuse. The readily available British Agrochemicals Directory, published from 1970, listed manufacturers of sodium chlorate herbicides and described numerous suppliers that continued to offer products without fire depressants. A more serious approach to security than sales restrictions, would have been to insist that all suppliers added fire depressants as a safety measure.

Misuse: Poisoning

Despite the insistence that sodium chlorate was harmless, the chemical was deliberately used for fatal self-poisoning, and recovery from chlorate poisoning involving doses of 20 grams or more was rare.⁷⁸ Sodium chlorate poisoned 113 people in England and Wales between 1945 and 1989.⁷⁹ Despite this figure, surprising for a chemical that was described as non-poisonous, it was unusual to find mention of deliberate use of sodium chlorate as a poison outside medical journals. Sodium chlorate was reported by a pathologist as tasting noticeably bitter, making it unsuitable for surreptitious poisoning, but this did not stop people from allegedly adding it to sandwiches,⁸⁰ tea,⁸¹ and cereal⁸² in their attempts at homicide. The aforementioned cases were all unsuccessful poisoning attempts, reported in newspapers for their engaging human interest stories of love affairs, angry husbands and suspicious wives, while disseminating the message that sodium chlorate was not an effective poison for humans. Accidental ingestion of sodium chlorate was infrequent, despite the visual similarity to innocuous substances like salt or sugar.⁸³

Therefore, it came as a surprise to gardeners when, after 70 years of use, and without having damaged those who used it legitimately and carefully as a weedkiller, the EU determined in 2008 that sodium chlorate should be withdrawn from the market

⁷⁸ R. K. Knight et al., "Suicidal Chlorate Poisoning Treated with Peritoneal Dialysis," *BMJ* 3 (1967): 601-602.

⁷⁹ P. Casey and J.A. Vale, "Deaths from Pesticides Poisoning in England and Wales: 1945 – 1989," *Human & Experimental Toxicology* 13 (1994): 96-97.

⁸⁰ "Weed-Killer Wife Jailed for Life," *DM*, 21 July 1973, 11.

⁸¹ "Spinster Killed Nosey Old Man – Police," *DM*, 03 April 1962, 6.

⁸² "Angry Husband 'Poisoned His Wife's Cereal'," *DM*, 16 October 1985, 8.

⁸³ M. Helliwell and J. Nunn, "Mortality in Sodium Chlorate Poisoning," *BMJ* 1 (1979): 37-38.

because of unspecified harmful effects on human health. Gardeners were puzzled, and suspected that the harmful effects were found in sodium chlorate's use in improvised explosives.⁸⁴ The ban meant that in Britain 41 products for amateur gardeners (including fire depressed brands) were withdrawn from the market, an indication that sodium chlorate had remained a popular choice for domestic users from the 1930s and beyond the 1980s. Sodium chlorate was not innocuous, but it was nonetheless very useful to domestic users who wanted a simple to use, multi-purpose, long-lasting and affordable weedkiller. The next section of this chapter looks at a weedkiller that filled a different niche. Instead of remaining in the ground to kill plants for a long time, paraquat was inactivated by clay particles in the soil, which meant that the ground could be cultivated soon after use.

Paraquat

"Paraquat is the B.S.I. [British Standards Institution] common name of the cation 1,1'-dimethyl-4,4'-bipyridylium, which is available as the dichloride of the di(methyl sulphate)".⁸⁵ This formal, chemical description of paraquat instantly reveals a complex, synthetic chemical that is very different from sodium chlorate. That relatively simple chemical name is clearly linked to the elements which make up the compound, whereas paraquat's relationship to its chemical composition is far less obvious to the average user. ICI discovered paraquat's herbicidal efficacy in 1947, and work started in earnest to characterise, test and formulate weedkillers based on paraquat from 1955. This endeavour took place at a subsidiary company of ICI, Plant Protection Limited (PPL) at their test farm Jealott's Hill (see Table 4.1).

⁸⁴ "Commission Decision Concerning the Non-Inclusion of Chlorate in Annex I to Council Directive 91/414/EEC and the Withdrawal of Authorisations for Plant Protection Products Containing That Substance," *Official Journal of the European Union* (18 November 2008); http://www.andrewbrons.eu/index.php?option=com_k2&view=item&id=27:sodium-chlorate-misuse-by-a-minority-hurts-the-majority. (accessed 11 August 2016). <http://www.sheffieldforum.co.uk/showthread.php?t=605870>. (accessed 11 August 2016).

⁸⁵ MAF 284/307, Scientific Subcommittee on Poisonous Substances used in Agriculture and Food Storage, "First Report on Paraquat," 23 March 1962.

Table 4.1 Timeline of relevant company activities and key events in paraquat's development

Date	Regulation/context	ICI Activity	Paraquat Event
1883			Paraquat first synthesised, used as redox indicator (not ICI)
1927		ICI buy Jealott's Hill farm, set up propaganda unit	
1933	Pharmacy and Poisons Act, establishment of Poisons Board		
1937		Form Plant Protection Limited with Cooper McDougal and Robinson	
1947	Fuel crisis delays manufacture of raw materials needed by chemical industry		Herbicidal activity discovered at ICI
1952	Agriculture (poisonous substances) Act		
1954		Boon and others move from Dyestuffs at Blackley to Jealott's Hill	
1957	Pesticides Safety Precautionary Scheme; Consumers Association (Assocn for Consumer Research Ltd)	Alderley Park opens and Pharmaceutical Division moves there	
1959		PPL losing money, become wholly owned by ICI, restructure of PPL	First large batch paraquat made
1961		Paraquat pioneer production plant	
1962	<i>Silent Spring</i> published	Second production plant for paraquat	Gramoxone enters agricultural market
1965	<i>Chemicals for the Gardener</i> 2 nd edition		Weedol enters domestic market
1966			First UK paraquat-related deaths recorded
1967	Farm and Garden Chemicals Act passed (not in force until 1973)	PPL gains Queen's Award for export activities, mainly due to paraquat	
1968		Improved paraquat production plant	Paraquat deaths begin to be reported in mainstream media; added to Poisons List
1972	Poisons Act, Poisons Board		
1973	Oil crisis; Economic recession until 1975	Patent expires, but PPL and other ICI subsidiaries remain the only producers	

Date	Regulation/context	ICI Activity	Paraquat Event
		in the UK	
1974	Health and Safety at Work Act; Health and Safety Commission established Stricter rules for poisons sales		Stenching agent added to Gramoxone
1975			Weedol changed to include diquat, reducing the paraquat content
1977			Emetic added to Gramoxone and Weedol
1987			Germany refuses to use paraquat

Table 4.1: Timeline of relevant company activities and key events in paraquat's development.

PPL and ICI worked closely together throughout the development, approval and monitoring and redevelopment processes, so where it was clear to me that something occurred at Jealott's Hill, for instance, when a letter was written on headed notepaper or a report was identified as originating from there, I have referred to PPL. The press, however, mentioned PPL or Jealott's Hill when reporting where the product was developed and made, but in the context of reporting deaths, referred instead to ICI. Therefore, in these cases I have also referred to ICI.

Paraquat was first available to agricultural and horticultural professionals in 1962 as a product called Gramoxone. In 1965 amateur gardeners could buy a specially developed, less concentrated version called Weedol. This situation is different to the previous case study, as domestic and professional users bought the same sodium chlorate brands, just in different volumes. Another difference is that Gramoxone and Weedol both passed the scrutiny of the Pesticides Safety Precautionary Scheme (PSPS), implemented in 1957 and therefore not applied to sodium chlorate. The PSPS considered the evidence presented by the manufacturers and deemed that when paraquat was used carefully, it was not expected to endanger the health of users or others. ICI and PPL heralded paraquat as a revolutionary new weedkiller,⁸⁶ although the distinction between Gramoxone and Weedol, and their different user groups, was hardly ever made in the press. Even when paraquat acquired a reputation as a "killer chemical"

⁸⁶ R.L. Wain, "William Robert Boon 20 March 1911-28 October 1994," *Biographical Memoirs of Fellows of the Royal Society* 43 (1997): 139;

– and not just for its action on plants, the distinction between professional and amateur products was ineffectively made. Since it came onto the market, acute paraquat poisoning has been responsible for more deaths in Britain than all other pesticides combined. Between 1945 and 1989, 1012 deaths from pesticide poisoning occurred, with paraquat responsible for 570 (56%). Of the 787 deaths from herbicides, paraquat was responsible for nearly three quarters (72%). To provide perspective, the 1012 deaths represented only 1.1% of all fatal poisonings, so pesticides were not proportionally the largest poison threat. Out of all chemicals, prescribed medicines caused the most poisonings.⁸⁷ Nevertheless, the fact that paraquat acquired a reputation as a killer chemical when it was not unusually or especially poisonous makes it an interesting case study. This section of the chapter looks at the development of paraquat as a herbicide, its uses in Britain, and how the user categories established by the product makers were often ignored by the users themselves.

Gramoxone, a product intended for use by farmers, was a brown liquid containing paraquat at a concentration of 20%, which was diluted in new, specially designed, dedicated spraying equipment. For the domestic market, PPL initially planned to offer a less concentrated mixture of diquat (a close relative of paraquat) and paraquat as a liquid herbicide in a smaller volume to home gardeners, branded as Weedol.⁸⁸ The reason for giving domestic users a less concentrated product was to avoid the risks associated with storing a high strength, caustic chemical at home. However, neither the differences between Weedol and Gramoxone nor the rationale for having two different products, were explained to domestic users.

Although the PSPS regulatory board considered agricultural users competent to handle the liquid paraquat, they were apprehensive about allowing domestic users a similar product. Therefore, although the PAC had approved Gramoxone for use by farmers, they refused to give liquid Weedol clearance and demanded better understanding of its physiological effects on humans, particularly the weedkiller's irritant effects on skin, before it could be marketed to domestic users. PPL tried to

⁸⁷ P. Casey and J.A. Vale, "Deaths from Pesticides Poisoning in England and Wales: 1945 – 1989," *Human & Experimental Toxicology* 13 (1994): 95-101.

⁸⁸ J.A.R. Bates, "First Report on "Weedol" Garden Herbicide," 1961, MAF 284/289, TNA.

satisfy the committee, but ultimately they could not explain the mechanism. Having seen that the committee were particularly worried by toxicological data on diquat that showed it caused cataracts in rabbits, PPL removed the diquat from their proposed Weedol formula. As far as anybody could tell from tests on laboratory animals and the experiences of farmers who had used Gramoxone, paraquat was a skin irritant which disrupted nail formation and could be poisonous if ingested or absorbed through the skin in large doses.⁸⁹ Weedol would be marketed in the form of sachets of pellets containing 5% paraquat, which the domestic user dissolved directly in a two gallon watering can or sprayer.⁹⁰ In this way, amateur gardeners avoided measuring out the weedkiller and would only make enough to be used for that session of weeding, which also avoided storing the solution for future use. Gardeners were instructed not to alter the proportions of Weedol to make a more concentrated solution because it would be wasteful. This highly prescriptive presentation of Weedol can be contrasted to the individualised ways that gardeners could use sodium chlorate.

Once Weedol received provisional commercial clearance in 1964, the first Weedol users were PPL's own staff, a convenient and accessible sample of domestic users from whom the company could gauge product satisfaction and compliance with the instructions before Weedol was marketed more widely in 1965. As genuine users, in real garden situations rather than carefully controlled laboratory conditions, they were able to feed-back information about their experiences using the product to the company, which then influenced the instructions on the packaging.⁹¹ Nevertheless, as user behaviours came to light once the product was on general sale, the labelling and instructions were further revised for both Gramoxone and Weedol.

Misuse: Poisoning

In 1966, the year after Weedol began to be sold widely, and after two incident-free years of agricultural use of Gramoxone, accidents began to happen among farm

⁸⁹ "Extracts from Minutes: Advisory Committee on Poisonous Substances Used in Agriculture and Food Storage," 20 March 1962, MAF 284/307, TNA.

⁹⁰ "Third Report on Paraquat 'Weedol' for Amateur Use," March 1964, MAF 284/289, TNA.

⁹¹ "Weedol Co-operator Trials," 1965, MAF 284/307, TNA.

workers which confirmed that paraquat was indeed fatally poisonous to man.⁹² There were no formal systems of reporting adverse outcomes from using agricultural chemicals, so company researchers and members of the regulatory committee gathered details of fatalities from coroners' reports which appeared in newspapers.⁹³ These deaths from Gramoxone related to two specific instructions associated with the product: that it must never be repacked and that it was "not to be taken".

The careful wording avoided spelling out the consequences of non-compliance. The accumulation of accidental poisonings that occurred as a result of Gramoxone having been decanted into beverage bottles prompted Roy Goulding, founder of the National Poisons Information Bureau,⁹⁴ and a member of the Poisons Board which liaised with the PSPS, to consider how to prevent further accidents: "How we can deter them I don't know, but labelling the concentrate as poison might help."⁹⁵ Pressure also came from representatives of agricultural users, when the Essex branch of the National Farmers Union (NFU) wanted the severity of the dangers of misusing Gramoxone to be emphasised on the label.⁹⁶

ICI had been resistant to suggestions that the word "Poison" should be included on the label, as they did not want potential users to be scared by the product being in the same category as arsenic, and therefore to avoid their product, nor did they want people to use it as a poison. They called attention to other agricultural chemicals that only needed to have the word "caution" on their labels despite their acute toxicity in rats being greater than that of paraquat. ICI maintained that when users followed the instructions, the product was safe.⁹⁷ Although the PSPS advisory committee appreciated ICI's argument, they remained concerned about users who might not follow the instructions.

⁹² N.W. and H.E.V, "Weedol Data Sheet, 3rd Notification," 12 March 1964, MAF 284/307, TNA, 3. In the "Toxicity to Man" section, the only information available was that regarding exposure to spray. "Paraquat and Diquat Liquid Formulations: Summary of Experience of Human Exposure December 1965 - May 1967," 14 June 1967, MAF 284/307, TNA.

⁹³ "Coroners and the Public Interest," *BMJ* 3 (1974): 374.

⁹⁴ "Information On Poisons," *BMJ* 1 (1963): 1220.

⁹⁵ Roy Goulding, "Letter to J.A.R. Bates: Paraquat," 16 August 1967, MAF 284/307 doc.104, TNA.

⁹⁶ Peter Bullen, "Weedkiller Warning," *DM*, 25 May 1968, 4.

⁹⁷ A.A.B. Swan, "Letter to F. Stewart," 13 May 1968, HO305/32, TNA.

In contrast to sodium chlorate which was sold freely to any adult with only the issue of quantity being of concern, the concentration of paraquat in professional products required Gramoxone sellers to be registered to sell the product, and ensure that only genuine agricultural or horticultural users, not amateur gardeners, bought it. This arrangement was initially in the form of an agreement, rather than a legislative restriction. As well as being highly concentrated, Gramoxone was sold in large volumes. The minimum packaged volume of Gramoxone, one gallon,⁹⁸ was much more than a domestic user would need for their own garden, and the cost of this quantity was considered high enough that average domestic users ought to have been deterred.

However, there was no watertight demarcation between domestic and professional users. Not all retailers were strict, and there was demand from small-scale agricultural users, crofters and small-holders to provide smaller quantities. These types of users, especially in Ireland according to ICI, bought small amounts of agricultural chemicals in reused containers such as drinks bottles and stored them in their homes, putting this user group at far higher risk of being accidentally poisoned.⁹⁹ To address this problem, in 1967 ICI sent what they called a “strongly worded letter” to their main distributors reminding them about the dangers of selling Gramoxone that was not in its original container.¹⁰⁰ Such behaviour was not confined to Ireland, for instance when a chemist in Cambridge was found guilty of gross carelessness and fined after they sold Gramoxone in a reused lemonade bottle to a schoolmaster and delivered it to his doorstep.¹⁰¹

As well as chemists and agricultural merchants, allotment associations had been identified as a route through which amateur users could obtain Gramoxone, because associations bought chemicals in bulk to divide among their members.¹⁰² Therefore, inevitably, they were sometimes the source of the illicit agricultural paraquat that ended up in homes.¹⁰³ In 1968, fears about horticultural societies being at the root of an

⁹⁸ Plant Protection Limited, “SC1174: Gramoxone Data Sheet,” 1962, MAF 284/307, TNA.

⁹⁹ A.A.B. Swan “Letter to F. Stuart,” 16 February 1968, MAF 284/307, TNA.

¹⁰⁰ *Ibid.*

¹⁰¹ C.E. Rabington “Letter to J Rowe,” 09 November 68, MAF 284/307, TNA.

¹⁰² G.R. Holloway, “Letter to Bates,” 25 October 1968, MAF 305/32, TNA.

¹⁰³ P. Stewart, “Letter to G.R. Holloway ‘Paraquat’,” 30 April 1969, MAF 305/32, TNA

accidental poisoning were realised. Mr Smith, a haulage contractor, obtained the weedkiller through an allotment association and stored it in a soft drink bottle in his shed. His 15-year-old son Alex drank it, believing it to be cola. This was the first paraquat poisoning to be reported in national news, but neither the weedkiller, the involvement of the horticultural club nor how Alex came to encounter the poison were the focus of reporting, because Alex became Europe's first lung transplant patient.¹⁰⁴

From 1965 Weedol was widely available, so small-scale users, such as allotment holders and amateur gardeners, should not have had to ask Gramoxone retailers to break their agreement, to deceive them, or to find loopholes. Weedol adverts suggested simply going to "your shop",¹⁰⁵ instead of listing the diverse outlets where users could buy their garden supplies. Weedol was packaged for shelf display and self-service, with plenty of information incorporated on the exterior of the box. Even some of the language in the instructions had been simplified, with "weedkiller" substituted for herbicide and "breathe" instead of inhale.¹⁰⁶

Following 20 fatalities from ingesting liquid paraquat formulations worldwide, of which eight occurred in Britain, Gramoxone was included in the lowest grade of the Poisons List, Schedule II from September 1968.¹⁰⁷ This response demonstrates that a very small number of misusers caused Gramoxone to be classified as a poison despite the fact that the majority of paraquat users were compliant and careful. When agricultural paraquat products were added to the Poisons Schedule, ICI took care to explain in their press release that granular Weedol for domestic users was exempt from the classification.¹⁰⁸ In public, ICI welcomed the stricter rules but also blamed the new regulations on those "silly and irresponsible"¹⁰⁹ retailers who had broken the conditions of Gramoxone's sale.¹¹⁰ Scheduling was quickly exposed as ineffective in 1972 when

¹⁰⁴ "Boy and Girl in lung-swap operation," *DM*, 13 May 1968, 1; "Lung Transplant in Edinburgh," *Glasgow Herald*, 17 May 1968, 1; "Lung boy sits up for icecream," *DM*, 18 May 1968, 1; "Lung transplant boy dies," *DM*, 29 May 1968, 1.

¹⁰⁵ "Don't waste time with weeds," Weedol advert placed 1967 in *TT*, *DM*, *Daily Mirror* and *Express*.

¹⁰⁶ Letter from Labrum to Wiseman (PPL) 02 August 1965, 61, MAF 284/307, TNA.

¹⁰⁷ G.R. Holloway, "Letter to F. Stewart: Paraquat," 12 March 1968, MAF 305/32, TNA.

¹⁰⁸ "Killer chemical goes on Poisons List," *DM*, 09 September 1968, 6.

¹⁰⁹ "Poison death: Firm rapped," *Daily Mirror*, 31 October 1972, 9.

¹¹⁰ "Killer chemical goes on Poisons List."

investigative reporters from the *Daily Mail (DM)* bought Gramoxone from different vendors around the country. The journalists found that the salespeople responsible for regulating access to these dangerous chemicals exhibited very little interest in buyers or their plans for the chemical.¹¹¹ The large amount of negative publicity associated with paraquat poisonings worried the NFU, who were anxious that curbing retailers could make Gramoxone more difficult for farmers to obtain for legitimate use.¹¹²

The proposal to take paraquat off the market was considered “a shame” because it was such an effective agricultural weedkiller, not to mention the job losses that could follow if the manufacturing plant was shut down. Therefore, ICI were “happy to see a much stricter rating” to reassure people “appalled” at the laxity of control. In 1974, the reclassification of Gramoxone as a Schedule I poison was well publicised.¹¹³ Now the buyer had to sign a poisons book, a process intended to emphasise to the user that they should take special care with the product and also to record the buyer’s name.¹¹⁴ In addition, buyers were required to have a certificate stating that they were entitled to buy poisons. These safeguards appeared credible but were in fact easily circumvented by anyone determined to get hold of the product. Obtaining a certificate was not difficult because “all householders are authorised to give certificates certifying a person to be one to whom a poison may properly be sold”. Additionally, buyers entered false names into the Poisons Book.¹¹⁵ Needless to say, such measures did not resolve the problem of deliberate and accidental paraquat poisonings and managing the relationship between buyers (legitimate or not) and retailers was very difficult.

On the whole, domestic users would have been highly unlikely to have encountered sales adverts for Gramoxone, although they may have seen it mentioned in profile-raising adverts from ICI which explained the benefits to society of products made

¹¹¹ “Should this killer be allowed?” *DM*, 30 August 1972, 6.

¹¹² P.H. Easton, “Regulations on the Sale of Paraquat,” HO305/32, TNA, 1973.

¹¹³ “Now paraquat must carry poison label,” *DM*, 02 February 1974, 11.

¹¹⁴ D.A. Wrigley, Memo, 18 October 1972, HO305/32, TNA.

¹¹⁵ R. Kendall “Letter to G.R. Waters,” 22 January 1974, HO 305/32, TNA; “Strict controls imposed on paraquat weedkiller,” *TT*, 02 February 1974, 2; “Now paraquat must carry poison label,”; “Paraquat’s toll of 97 victims,” *Daily Express*, 13 July 1974 (mentions murderer Jennifer Kenyon using a false name).

by ICI and their subsidiaries.¹¹⁶ *The Times* did carry adverts for Gramoxone in its farming supplement,¹¹⁷ but they differed in both style and content to those for Weedol, emphasising the separation between the products and their intended users.

The key words from adverts for Weedol are summarised in Table 4.2. What cannot be gauged easily from this table, yet is worth mentioning, is that Weedol adverts occupied much more space on the page than adverts for sodium chlorate ever did, reflecting the size and greater resources of PPL's parent company, ICI. Early Weedol adverts were more informative than later ones, as they were crafted to explain to potential users how Weedol worked and to shape user expectations. As the product became better established, and as advertising fashions changed, the text included fewer detailed explanations; new users who were primed by the eye-catching adverts could scrutinise the packaging in store for more information about how and where to use Weedol. Great pains were taken to put across the ease and simplicity of use, emphasising the role of the plant's own "natural" processes in its demise. From Weedol's introduction in 1965 until 1977 advertising campaigns for the weedkiller addressed safety and harmlessness alongside its ability to relieve the gardener of hard work. From 1978 the adverts left out safety and harmlessness, instead focussing on the speed and ease of using Weedol. Turning away from the possibility of risk at this time is interesting because the product was safer than ever, but it was no longer considered to be a relevant point for marketing. This change suggests a number of possibilities, including the realisation that users were indifferent to, perhaps even sceptical of safety claims, or that users genuinely did value convenience and reduced effort in the garden above safety. It is hard to make firm statements concerning the adverts' intent, as details of marketing decisions do not appear to have been archived by the company.

The language in Weedol adverts was restrained, and the adverts did not refer to weeds as enemies, or to weeding as a war, focusing instead on saving time and effort. The low costs were consistently highlighted, which demonstrates an awareness that

¹¹⁶ "ICI Research, the Springboard of Progress," *TT*, 01 July 1963, 9; "ICI Action against Hunger," *TT*, 19 August 1974, 5.

¹¹⁷ "I.C.I. Gramoxone," *TT*, 07 December 1964, ii.

Weedol was perceived by users to be expensive and that the cost had to be justified,¹¹⁸ although this was not unusual in weedkiller adverts described earlier in this chapter.

Table 4.2 shows how different socioeconomic groups of potential purchasers were reached through different papers. *The Times* rarely carried Weedol adverts, unlike the *Express*, *Mail*, and *Mirror* daily and weekend papers which included them more frequently, in greater variety and with richer details. Advertising in these tabloids was better value than in *The Times* because they had greater circulation. However, paying for print adverts was not the only way to reach potential users, as approximately once a month *The Times* gardening correspondents recommended using paraquat, even referring to it by the brand name Weedol.

Despite the absence of archived or accessible market research for much of this period, the results of some early research carried out for Weedol, and filed as part of the PSPS review, show that the intended market was a middle-aged demographic of gardeners.¹¹⁹ Although the research did not explain why this segment was targeted, possible explanations include greater disposable income, being accustomed to saving time with other convenience products, as well as being open to new ideas, or at least not as habituated to the work involved in maintaining a garden. Nevertheless, older people did welcome paraquat¹²⁰ but they did not necessarily choose Weedol. For instance Grace and Josiah Walker, who were both aged in their 70s and were accidentally poisoned by the Gramoxone that they kept at home in an old sherry bottle.¹²¹

An examination of some of the users depicted in the adverts allows us to see how these middle-aged or older gardeners able to afford the newest weedkiller were imagined. The “Stand up to weeds!” advert was first placed in mid-April 1968, showing the lower half of a male user in neat trousers and a shirt, standing with a hand on his hip and holding a watering can with which to apply weedkiller.¹²²

¹¹⁸ Bureau of Commercial Research Ltd., “Report of a Placement Test for Weedol Weedkiller October 1964,” MAF 284/307, TNA.

¹¹⁹ *Ibid.*

¹²⁰ Charles Darby, “How Paradise Found Its View Again,” *DM*, 07 May 1966, 9.

¹²¹ “Poison Husband’s Grief,” *DM*, 23 November 1977, 11.

¹²² “Timothy Whites Super Summer,” *Daily Express*, 17 May 1968

Table 4.2 Weedol advertising campaign keywords.

Year	Advert	Paper	User image	Key phrases	Advertised Price
1965	Ends the work of weeding	Express, Mirror	No user	Hard work, neutralised, harmless	5/6
1966	End the work of weeding	Express, Mirror, Mail	Hands, feet	Safely, harmless, easier, endless, economical, accurate	5/6 (2 drum pack) 19/6 (8 drum)
1967	Don't waste time with weeds	Times, Express, Mirror, Mail	No user	Time, revolutionary, safely, save hours	5/6 (2), 9/6 (4), 17/6 (8), 32/6 (16)
1967	My Dad's a Weedol weeder	Express, Mirror	Father (plus daughter)	Saves hours, kills, harmless	5/6 (2), 9/6 (4), 17/6 (8), 32/6 (16)
1968	Stand up to weeds	Mirror, Mail	Male	Gardeners, revolutionary, kills harmless	5/6 = 40 sq yds
1969	Block the living daylight out of weeds	Express, Mirror, Mail	No user	Low priced, harmless, unique, rain, time saved	Sprinkle bar 3/- applicator 15/6
1970	[month]...in the garden with ICI	Mail, Express, Mirror	No user, but male tech advisor	Save hours of back breaking	----
1970	... without killing the soil or your back	Mail, Express, Mirror	Gloved hand	Backache, harmless, economical, ordinary, cost	Avg sized garden/yr 30 bob, 2 drum 5/6, money saving bulk
1970	Your garden pin up	Amateur Gardening Annual	Non-user woman	Easy	
1971	Two ways	Mail, Express, Mirror	Male	Back-breaking, minutes, kill, harmless, cost	40 sq yd = 30p
1975	... without killing the soil or your back	Mail, Express, Mirror	Male	Kill, safely, inactivated, economical, hours, back-breaking	-----
1977	Fast and easy.	Mail, Express	Percy Thrower	Safely, backache	----
1977	...plenty of help	Mail, Express	Percy Thrower	Compete [weeds compete for resources], safely	----
1978	Stop weeds going to bed with your flowers	Mail	No user	Easy, kill, rain, effective	----
1979	Our weeders choice/ Weedol about it	Express, Mail, Guardian	No user	Kill, revolutionised, hours	----
1980	Don't let weeds be the first sign of spring	Times, Guardian	No user	Effective, speedy, inactivate	---
1981	The British gardener's No.1 weedkiller	Mail	No user	Kill, harm, inactivated, risk, rain, gardeners	---
1984	Weeds stop here	Mail	No user	Inexpensive, Care	---

Table 4.2: Decimalisation facilitated a price rise, with 30 pence being equivalent to 6 shillings, when previously the same pack to treat 40 square yards was slightly less expensive at 5/6.

This figure had been removed due to copyright restrictions

Figure 4.9: Weedol advert, Daily Mail 08 April 1971 © Daily Mail Historical Archive

The phrase “Stand up to weeds” refers to both the physical action of weeding, which with Weedol no longer involves bending or kneeling, as well as overcoming the

relentless invasion of weeds in one's garden. This physicality of weeding was alluded to again in 1971, when a Weedol user was compared to a caricatured non-user (Figure 4.9). Depictions of backache caused by weeding by hand was a well-established strategy, used by weedkillers in the 1930s.¹²³ In "Two Ways To Weed" (Figure 4.9), the Weedol user conveyed, through his casual clothes, his relaxed, upright stance and pipe smoking, the impression of being at ease. The appearance of the gardener using Weedol in these adverts communicated how easy and clean the product was. If Weedol was not available, the user had to manually weed instead, and wear clothes which they did not mind getting stained with grass or mud. The presence of the pipe is emblematic of masculinity, and suggests that the user was unhurried and at leisure,¹²⁴ but also that Weedol was safe to use. If the user had to weigh out the chemical, they risked getting it on their hands then transferring the herbicide to the pipe, then into their mouth.

Although claims were made on Weedol's packaging about paraquat "revolutionising" weeding, no adverts depicted anything particularly chemical, revolutionary or modern, much like adverts for sodium chlorate which showed people using the chemical within a simple garden scene. Applying weedkiller was presented as a mundane chore, while the power and dominance of the user over weeds was kept low-key. These very ordinary domestic images helped to normalise chemical use and emphasise that although the pace of life may have speeded up, once safely at home, gardening was still very much a leisurely activity.

The advertising images for Weedol contrasted sharply to the "science fiction" of paraquat poisonings.¹²⁵ What surprised doctors who treated the first Gramoxone poisonings, not to mention all those who had been involved in examining the chemical's risks and hazards, was that paraquat had a peculiar effect on lung tissue. It irritated the membranes across which gas exchange occurs. In turn, the irritation reduced the efficiency of the lungs, and caused such a dramatic repair response that the proliferation of cells solidified the lungs. ICI conducted further research into paraquat poisoning at

¹²³ "Tomlinson & Hayward Advertisement," *Amateur Gardening*, 05 May 1934, 24; "Sofnol Advertisement," *Amateur Gardening*, 09 June 1934, xx.

¹²⁴ Matthew Hilton, *Smoking in British Popular Culture, 1800-2000* (Manchester: Manchester University Press, 2000), 119.

¹²⁵ Jane Gaskell, "The Boy Who Thought He'd Had a Drink of Pop," *DM*, 24 June 1971, 6.

their Central Toxicology Laboratory, and found that paraquat reacted with a cellular transport process in the lungs, causing this characteristic damage.¹²⁶

Despite doctors' best efforts to mimic the chemical's deactivation seen in clay soils¹²⁷ by using Fuller's earth or kaolin to bind the chemical in the body, their experimental treatments were often unsuccessful. Press coverage invariably conveyed the lack of effective treatment, often with the stock phrase "no known antidote". As the main inventor of paraquat Bill Boon wearily noted, this statement was technically accurate, but not unusual, because very few poisons have an antidote, not even aspirin.¹²⁸ However, the phrase became inseparable from paraquat. It grabbed public attention and became a useful shorthand for expressing the despair that was experienced by victims, their families, and the doctors who cared for them. Although not articulated in documentary sources, the knowledge that a chemical that had such severe effects and the idea that it had been approved for safe use appeared highly incongruous.

As the chemical that caused the horrific poisonings was in fact the agricultural concentrate, it is important to note that sometimes deception or theft were the routes through which the Gramoxone entered homes.¹²⁹ In trying to explain what motivated people to take Gramoxone home from work, MAFF described these domestic users as trying to avoid the expense of buying Weedol.¹³⁰ Certainly, Weedol was perceived by users as expensive.¹³¹ Market research revealed that, from its introduction, potential users expected the price for such a product to be between 3s 7d and 4s rather than the recommended retail price of 5s 6d.¹³² By 1973 Weedol had remained at the same price for eight years, also seen in Table 4.2, which prompted an investigative journalist to

¹²⁶ L.L. Smith, "Mechanisms of Paraquat Toxicity in Lung and Its Relevance to Treatment," *Human & Experimental Toxicology* 6 (1987): 31-36.

¹²⁷ James Keir Howard, "Paraquat - in Use and Misuse," (M.D, University of Edinburgh, 1982), 162.

¹²⁸ Carol Kennedy, *ICI: The Company That Changed Our Lives* (London: Paul Chapman Publishing, 1993), 148.

¹²⁹ Extract from minutes of 66th Meeting of the Poisons Board, 23 February 1973, HO305/32, TNA.

¹³⁰ P.N.M. Moore documenting a telephone conversation with G.R. Holloway, 26 June 1968, MAF 284/307 doc182, TNA.

¹³¹ Patricia Tisdall, "Gardening - Digging into Your Pocket," *TT*, 10 August 1976, 18.

¹³² Bureau of Commercial Research Ltd., "Report of a Placement Test for Weedol Weedkiller October 1964," MAF 284/307, TNA.

calculate that the domestic product was eight times more expensive than its agricultural counterpart Gramoxone. The solution to accidental poisonings with illicit Gramoxone, he suggested, would be to reduce the cost of Weedol.¹³³ The high price resulted from the need to recoup the costs of development and manufacturing, extended by the changes in formulation to satisfy safety concerns. More worryingly, because nothing was done, in 1969 PSPS expert groups had identified the high cost of Weedol as a factor that could push some users towards Gramoxone, which was likely to be stored inappropriately.¹³⁴ An article on the general expenses of gardening, highlighted Weedol as an example of manufacturers trying to “thwart” gardeners who wanted to economise by buying in bulk and criticised the fact that a box of four sachets only treated 80 square yards.¹³⁵ This complaint was based on the belief that buying supplies in bulk was cheaper for the gardener, without considering any other reasons, such as safety, that explained why products were marketed in small quantities. Additionally, unless one was clearing an entirely weed-infested garden, a sachet treated 20 square yards which, in an average sized garden, was sufficient if Weedol was used in the recommended way. Much like the housewives in Chapter 3 who were oblivious to the importance of Thawpit’s non-flammability, some home gardeners did not seem to connect the significance of paraquat being supplied in small quantities to the enormous amount of publicity about the dangers of the chemical. Therefore, perceived value for money, rather than a concern for safety may have been the driving force behind domestic users choosing Gramoxone instead of Weedol.

This section has focused exclusively on accidents involving Gramoxone, which was never intended to be used domestically. From Weedol’s launch in 1965 until May 1967, a “probationary” period during which Weedol use was especially carefully monitored in order to report back to the PSPS committee, 7 million units were sold, and there were five medical incidents, all non-fatal, associated with normal use. Only one was a case of poisoning, when a child “who should not have access to the preparation” ate the granules, although the outcome was not mentioned, and the others were skin

¹³³ Nigel Hawkes and Jane Edgington, “Ban This Poison,” *The Observer*, 25 March 1973, 44-45.

¹³⁴ Scientific Subcommittee on Poisonous Substances used in Agriculture and Food Storage, “Extract from Meeting 09 September 1969,” TNA.

¹³⁵ Tisdall, “Gardening - Digging into Your Pocket.”

irritation due to “carelessness”. Considering the volume sold, this was a tribute to how safe the domestic product could be in practice.¹³⁶ Even when gardeners had experienced rashes linked to Weedol, they were reported to have been undeterred from using the product,¹³⁷ suggesting that Weedol was useful and desirable to home gardeners. Although the PSPS committee had focused on avoiding corrosive splashes when they advised against a liquid, Weedol’s soluble granules had the benefit that the weedkiller could not be mistaken by users for any other household or edible ingredients.

In the 1970s, despite the fact that newspapers appeared to either lose interest or reassess their ethical position on reporting paraquat poisoning cases, most of the paraquat deaths were in fact suicides. When reporting how easy it was to obtain Gramoxone and what size dose was lethal, the media effectively put the idea of misusing the herbicide as a poison into public circulation, validating and perpetuating the chemical’s misuses. In comparison to sodium chlorate, which was used in suicides but very rarely received such publicity, the difference is stark.

Although newspapers played a part in generating hysteria around the misuse of paraquat, the press also delivered important educational messages to domestic users about the safe storage and use of chemicals. Newspaper articles were considered so effective that civil servant R.A. Kendall wondered “whether there is much scope for useful Government publicity on top of all the educative publicity already given by the newspapers to paraquat accidents”.¹³⁸ Beyond announcing changes to the status of paraquat as a scheduled poison, the government therefore did not take any further action to educate the public on this subject.

Preventing Misuse

Users demonstrated that they were very hard to control, no matter how carefully and clearly warnings and instructions were articulated. Users easily, or wilfully, ignored printed and verbal instructions, or never saw them at all if they received paraquat in a beverage bottle. Unfortunately, the threat of fines and of being prevented from selling Gramoxone were not effective deterrents for vendors who continued to sell agricultural

¹³⁶ “Fifth report on paraquat - Home Garden Use,” MAF 284/307, TNA.

¹³⁷ “Medical Record of Weedol Use,” MAF 284/307, TNA.

¹³⁸ R. Kendall, “Letter to J. Harrison,” 27 March 1973, HO305/32, TNA.

products to domestic users. Although ICI representatives put full responsibility for accidents on users' noncompliance with their instructions, in order to continue being able to sell their herbicide they had to make their products harder to misuse.

Weedol was the first paraquat product to be changed, even though none of the highly publicised deaths caused by paraquat were attributed to Weedol. In 1971, diquat was added to Weedol's formula,¹³⁹ which reduced the amount of paraquat that it contained. The name Weedol was retained, but it was marketed as "new Weedol" (Table 4.2). This change had in fact returned Weedol to the original ingredients that had been rejected in 1962 by the PSPS because they had been concerned about cataracts.¹⁴⁰ This apprehension appears to have been erased by the experience in the intervening time of Weedol's granular formulation and its good safety record regarding splashes in the eyes.

When accidents with Gramoxone occurred in domestic situations, accidental consumption was the problem to be solved. Despite reservations that "those who drank paraquat in mistake for something else tended in any case to swig their drink back, without stopping to savour the bouquet"¹⁴¹ the addition of a stenching agent was the first change made to Gramoxone's formulation. The repulsive smell was expected to alert the user to the toxic nature of the liquid and prevent poisoning through mistaken identity or secretive administration by a poisoner. If the stench had not deterred the drinker, another line of protection was later added in the form of another ICI discovery, a triazolopyrazine referred to as PP-796, which was an emetic. From 1977, PP-796 was added to both Weedol and Gramoxone to reduce the amount of paraquat that could be absorbed.¹⁴² This additive was not mentioned in publicity.

In an effort to prevent small amounts of the concentrate being stored in inappropriately labelled bottles, it was suggested that ICI should offer small bottles of

¹³⁹ Roger du Botton, "Doomwatch Checks Chemical Safety," *Practical Gardening*, April 1971, 69; "April in the garden with ICI," *Practical Gardening*, April 1971, 89.

¹⁴⁰ "Extracts from Minutes: Advisory Committee on Poisonous Substances Used in Agriculture and Food Storage," 20 March 1962, MAF 284/307, TNA.

¹⁴¹ Extract from minutes of 66th Meeting of the Poisons Board, 23 February 1973, HO305/32, TNA.

¹⁴² T.J. Meredith and J.A. Vale, "Treatment of Paraquat Poisoning in Man: Methods to Prevent Absorption," *Human & Experimental Toxicology* 6 (1987): 49-55; C. W. Suckling and B. W. Langley, "Francis Leslie Rose, 27 June 1909 - 3 March 1988," *Biographical Memoirs of Fellows of the Royal Society* 36 (1990): 510.

Gramoxone in order to reduce accidental poisoning.¹⁴³ That suggestion again returned to ICI's original proposal for Weedol in a liquid formulation, which the PSPS committee had rejected. However, ICI did not implement this measure in Britain because when they had done so in Japan, where small-scale farming meant using correspondingly smaller volumes of Gramoxone, there had been shockingly high levels of suicidal use.¹⁴⁴ On one hand, a properly labelled bottle may have reduced accidental ingestion associated with the decanted product, but on the other, a small size had been clearly implicated in Japanese suicides. Therefore, ICI resisted promoting an affordable lethal dose when the product was already so strongly associated with suicide in Britain.

The reported problems of home Gramoxone use all related to the product being drunk, but there was no serious discussion of granulating the agricultural herbicide. Despite the fact that ICI had a great deal of experience with formulating fertilisers as dusts and granules,¹⁴⁵ PPL had developed Gramoxone as a liquid which relied on spraying equipment, so farmers worldwide were locked into this mode of delivery. It would have been difficult to make agricultural users switch to solid concentrate, and for a farmer, a sprayer blocked by incompletely dissolved granules was far more infuriating and expensive than an amateur gardener's blocked sprinkler bar on a watering can. Therefore, ICI researched making the liquid formulation thicker so that it would be harder to swallow, or producing it as a jelly-like formula, compromises that could accommodate both their professional and amateur paraquat users.¹⁴⁶ Despite all the instances when the liquid had been put into unlabelled bottles and mistaken for a drink, the possibility of a Gramoxone jelly being transferred to jam jars and mistaken as edible was not raised. Ultimately Gramoxone remained a liquid.

The issue of Gramoxone being mistaken for dark coloured drinks also presented a target for change. In a parliamentary debate on the Farm and Garden Chemicals Act, it was proposed that manufacturers of any garden chemical should in future strongly

¹⁴³ Hawkes and Edgington, "Ban This Poison," 44-45.

¹⁴⁴ Howard, *Paraquat – in Use and Misuse*, 147.

¹⁴⁵ Celia Kirby, *The Hormone Weedkillers: A Short History of Their Discovery and Development* (Croydon: British Crop Protection Council, 1980), 43.

¹⁴⁶ D.H. Morpeth, "Paraquat," 11 October 1972, HO305/32, TNA; R. Kendall, "Poisons Board: Paraquat," 07 February 1973, HO305/32, TNA.

consider the appearance of their products, using the example of Gramoxone's visual similarity to cola.¹⁴⁷ The focus on colour echoed older strategies of colouring poisonous chemicals, for instance when normally white arsenic formulations were given unmistakably vivid colours.¹⁴⁸ However, Gramoxone was a dark liquid, so it was much harder to add a colour that would stand out, and that was not achieved.

ICI had attempted to extend their patent rights when they expired but despite withdrawing their appeal,¹⁴⁹ paraquat continued to be produced only by that company or subsidiaries of it.¹⁵⁰ Concerns had been raised that without the extension of ICI's patent rights, any company could produce the potentially dangerous herbicide,¹⁵¹ and the improvements made to paraquat products may not have been uniformly applied, meaning that the scope for poisoning was not so effectively limited. This situation can be compared to that of DDT, described by Peter Morris. Geigy's liberal licencing policies meant that the chemical was manufactured and incorporated into all kinds of domestic products, becoming more widely used, and therefore harder to control, than if Geigy alone had manufactured it.¹⁵²

Instead of other companies making paraquat products, they reacted to the perceived dangers of paraquat and in the 1980s marketed new domestic weedkillers with the specific claim that they did not contain paraquat. Parallels can be seen with the adverts for herbicides in the 1930s, which claimed to be as effective as arsenic, yet not poisonous.¹⁵³ Nevertheless, the demand from gardeners for a contact herbicide that did not persist in the soil meant that Weedol was not immediately displaced. It also shows that a significant majority of users who bought and used the herbicide were not shaken by the negative publicity that paraquat received, considering themselves to be competent users. Despite inaccurate reports about herbicides and claims that paraquat

¹⁴⁷ "Farm and Garden Chemicals," HC Deb *Hansard* (20 June 1971): vol 821 cc1395-407

¹⁴⁸ T.H. Price, "Colouring of Liquid Arsenical Weedkillers, 1922," HO 45/11240, TNA.

¹⁴⁹ Martin Sherwood, "ICI, Patents and Paraquat," *New Scientist*, 09 November 1972, 239-240; Martin Sherwood, "Patently, a Lapse," *New Scientist*, 17 May 1973, 395.

¹⁵⁰ British Agrochemicals Association, *Directory of Garden Chemicals*, Ninth ed, (London: British Agrochemicals Association 1984).

¹⁵¹ Pearce Wright, "Controversy on Patent Rights of Weedkiller," *TT*, 09 November 1972, 5.

¹⁵² Morris, "A Tale of Two Nations."

¹⁵³ "Deeweed," *DM*, 04 July 1981, 27.

had “disappeared from many products”, Weedol was still on sale and regularly advertised well into the 1990s with ingredients paraquat and diquat prominently displayed as stipulated by law.¹⁵⁴

Conclusions

This chapter has shown that gardeners embraced weedkillers because they reduced the physical labour of weeding. Domestic users were encouraged to engage with the most up-to-date methods, but were also reminded that old, relatively simple chemicals, such as sodium chlorate, remained good treatments for certain weed problems. The domestic use of herbicides was not marketed to home gardeners as a “modern” answer to the problem of weeds. Instead, adverts referred to traditions of weedkiller use and promoted chemical use as ordinary: chemicals saved time and effort, which contributed to more leisurely gardening.

The differences and similarities between sodium chlorate and paraquat are summarised in Table 4.3. The table illustrates the reduced freedom that gardeners experienced with paraquat compared to sodium chlorate. Gardeners could buy and use sodium chlorate dry or as a liquid, and at a strength of their choosing. Paraquat use was far more prescribed, making it a restrictive experience compared to other weedkillers. In developing a separate, quite different domestic product to ensure that the chemical was used safely, the decisions made about formulation and presentation impacted on cost, which pushed some home gardeners into the unsafe behaviours that the manufacturers and PAC wished to avoid.

This chapter has therefore revealed tensions between users and regulators, when users actively circumvented measures that were in place to protect them. In press discussions or promotion of weedkillers, the brand was secondary to the active chemical and this preference was replicated in users’ vocabulary, even when paraquat could only be bought as a brand name product. This turn towards the chemical name reflects the practical and methodical approach required to choose the correct herbicide for the weed and the situation. Choosing not to use brand names such as Gramoxone and Weedol, but rather the approved chemical name paraquat, however, obscured the fact

¹⁵⁴ Victoria McKee, “Up the Garden Path?” *TT*, 28 April 1988, 18.; “Weedol,” *TT*, 06 May 1995, 50[S2].

that they were different products available to professional and amateur users. A parallel can be drawn between the newspaper promotion of DDT, then its subsequent rejection when it was revealed to be harmful, and the trajectory of paraquat.¹⁵⁵

Table 4.3 Summary table

	Sodium chlorate	Paraquat	
		Gramoxone	Weedol
Un/branded	Both	Only branded	
Different formulations for pro/ amateur?	-----	Professional – liquid concentrate for dilution	Amateur – weaker, granules to be dissolved
Effect on plants	Long lasting total weedkiller (kill all)	Kill grasses and broadleaf. Use on seedlings. Deactivated by soil = short term	
Applied	Dry or wet, users chose strength	Wet, dedicated equipment, strict instructions, no user choice	
Described as ... to people	Non poisonous	-----	Safe
Acute poisoning features	Brown blood/ organs	Corrosive, irritant, affected lungs, kidneys	
Accidental poisoning	Yes, but rare	Yes, often: dark drinks	-----
Suicide/Attempt	Yes	Yes	Yes
Murder	Yes	Yes	-----
Explosive	Yes	-----	-----
Introduced	1930s	1962	1965
Manufacturers	Many	ICI or subsidiaries only	
Withdrawn	2009	2007 (UK)	Formulation changed

Table 4.3 Table summarising the key points for sodium chlorate and paraquat.

The misuse of chemicals was also propagated by the press. It was striking that the use of sodium chlorate, which was used as a lethal poison hardly received media attention. In contrast, when paraquat was used for murder or suicide there was a great deal of press coverage, which stimulated others to use the chemical in this way and exacerbated the problem of misuse. There are two explanations for the difference

¹⁵⁵ Quest-Ritson, *The English Garden*, 251.

between reporting fatalities from sodium chlorate and for paraquat. The first is that paraquat had been passed by the PSPS, whereas sodium chlorate had not. The fact that paraquat had undergone toxicity testing and been approved as safe to use, but turned out to be capable of killing people, appeared contradictory. The PSPS did not promise completely safe chemicals, and ensured that instructions stressed the users' role in preventing harm when they used garden chemicals.

Nevertheless, the concept of safety was invoked in the very name of the scheme and although the importance of sensible behaviour was propagated through the government booklets *Chemicals for the Gardener* and the gardening press, news reporting focused on the danger associated with the chemical. The PSPS required research into paraquat's toxicity and modes of action on plants and experimental animals, but it did not demand that treatment for poisoning should be known. Instead the PSPS required clear, reasonable and simple step to avoid poisoning. The fact that paraquat did not have an antidote, despite barely any other chemicals in everyday use having antidotes, was seized on in what were otherwise unremarkable, albeit tragic, cases of poisoning.

The second explanation for the difference between reporting fatalities from sodium chlorate and from paraquat, is that sodium chlorate was made by many different manufacturers. The ready identification of a single large company, ICI, as the source of paraquat, rather than the numerous companies making sodium chlorate, provides the clue as to why paraquat generated such disquiet. As a multinational corporation, ICI provided a convenient and highly visible target. Additionally, built into the structure of the company were roles and procedures to deal with press enquiries, complaints and criticism.

The next chapter on photography contrasts with this examination of weedkilling, because home processing and flash photography became safer without the intervention of governmentally-monitored safety schemes. Advances in photographic technologies and the fact that users were often highly informed about the risks associated with their activity, meant that what had once been a dangerous occupation was no longer fraught with hazards. In addition, although photographers have not had to use dangerous chemicals, some chose to use them, were able to obtain them and generally used them safely.

Chapter 5: Home Processing

Processing photographs at home brought a great variety of chemicals into the domestic environment, yet curiously little has been written about either the chemicals or the people who used them. The British photographic chemical industry was small, and dominated by independent firms.¹ These included Johnsons of Hendon and Ilfords, who, like the large American companies, Kodak for example, researched and developed chemical processes, then manufactured and marketed photographic chemicals. Importantly for this thesis, these companies were keen to connect with their customers and contributed to the establishment of a well-informed, knowledgeable and careful group of users. Therefore, if dangerous photographic chemicals were replaced by safer ones, it was not as a result of direct government intervention. Instead, companies strove to make photographic processing safe and accessible, in terms of cost and skill level, to as many photographers who wanted to participate. The choice to carry out a series of involved, time-consuming chemical processes rather than out-sourcing to professional developers, for instance local chemists' shops, sets home processors apart from the other user groups studied in the previous chapters.

In this chapter, I will briefly introduce historic photographic chemicals used before the 1930s, then I will explore some of the changes in the presentation and composition of photographic processing products which were available between the 1930s and 1980s. Using manuals, magazines and personal testimony, as well as objects kept or displayed at the National Media Museum (NMeM) and the Hardmans' House, a National Trust property which represents a 1950s photography business and home, I describe the material and social cultures of home processing.

These sources are drawn on to construct this chapter's case studies, which cover only a very partial selection of the large variety of chemicals which, between the 1930s and the 1980s, photographers could use to develop and print (D&P) black and white (B&W) images. This aspect of chemical use in the home has been largely overlooked by historians of photography, perhaps because only a small proportion of photographers

¹ David Edgerton, "Industrial Research in the British Photographic Industry 1879 – 1939," in *The Challenge of New Technology: Innovation in British Business since 1850*, ed. Jonathan Liebenau (Aldershot: Gower, 1988), 106-108.

processed their own photographs. I also suspect that people have been intimidated by researching chemicals, whereas investigating the content of photographs and the motivations behind capturing moments are more inviting research topics. Nevertheless, without the processing chemicals, those images would not exist, therefore studying chemicals is relevant, even if processing was an activity undertaken by a minority.

One of the most important compounds in photographic developer, metol, will be examined in more detail. Metol was a vital active ingredient in several developer recipes and branded products, but also damaged some photographers' skin. Another case study centres on flash and the uses of powder and magnesium ribbon for illumination. Examining these chemicals provides an opportunity to question why photographers used potentially dangerous, flammable chemicals in the home when they did not have to. Carbon tetrachloride (CT), which was profiled as a household grease remover in Chapter 3, was also used by photographers, and allows comparison between photographers and other domestic users.

The chemicals chosen for these case studies show that manufacturers communicated risks associated with chemicals and developed products that moderated them, in addition to showing how individual users interpreted and acted on this knowledge. Throughout this thesis the health impacts of chemicals, particularly poisoning, have been shown to stimulate the implementation of regulatory measures to protect users, so in this chapter the control of photographic chemicals can be compared to other domestically used chemicals. I argue that personal traits of home processors, such as carefulness and responsibility, which were necessary to obtain good prints, were important factors in explaining why photographers have been free to use, if they so wished, potentially dangerous chemicals. These studies of home processing chemicals also facilitate discussion about a number of successful companies active in Britain, including Johnsons, Kodak and Ilford, who manufactured and promoted the chemicals that photographers depended upon. These manufacturers proactively developed increasingly safe chemical products, and willingly provided information about them to users who were generally responsible and careful, so they did not attract intervention from regulatory bodies. The sample of photographic chemicals chosen for analysis represent the main hazards that home processors working in Britain encountered between the 1930s and the 1980s.

The use of photographic chemicals is strongly linked to the technologies of plates, films and printing papers. Michael Pritchard, one of the few historians to write about the domestic use of photographic chemicals, pointed out how before 1914 there were no commercially available sensitised glass plates. The ready availability of affordable and reliable commercially prepared plates and films meant that, by the 1930s, developing and printing B&W images were the most fundamental and common uses of chemicals by photographers.² This chapter studies the period from the 1930s to the 1980s, when photography was predominantly based on transparent, flexible film coated with light sensitive silver halides.³ Rather than investigate the chemicals contained within the film or printing paper, a topic well examined by Hercock and Jones's history of Ilford, as well as Jack Coote's history of colour photography,⁴ the aim of this chapter is to complement accounts of film technologies and business histories by exploring the chemicals used for D&P at home.

The fact that J.T. Chapman of Manchester provided D&P services for glass plates in 1938, and that Kodak resumed manufacturing plates in the same year, shows that this medium remained popular among amateur and professional photographers.⁵ However, films of various lengths and specifications were more widely used and developed at home throughout the whole period studied. Moreover, they usually required the same chemicals as plates. For simplicity, I therefore focus on home processors who worked with film. Colour film became available in the mid-1930s, but was more complex to process satisfactorily, so was not as widely attempted. B&W film remained commonly used, as demonstrated by the inclusion of B&W film and commercial processing in the Retail Prices Index (RPI) basket from 1952/56 until 1987. The RPI basket is useful to historians because it represents a snapshot of typical consumer items. In this case, it

² Michael Pritchard, "Who Were the Amateur Photographers?" *either / and* (03 June 2013) <http://eitherand.org/reconsidering-amateur-photography/who-were-amateur-photographers/> (accessed 04 October 2015).

³ Peter Adelstein, "From Metal to Polyester: History of Picture Taking Supports (1987)," in *Issues in the Conservation of Photographs*, ed. D.H. Norris and J.J. Gutierrez (Los Angeles: Getty Conservation Institute, 2010), 389-393.

⁴ R. J. Hercock and George Alan Jones, *Silver by the Ton: The History of Ilford Limited, 1879-1979* (London: McGraw-Hill Book Co., 1979); Jack Coote, *The Illustrated History of Colour Photography* (Surbiton: Fountain Press, 1993).

⁵ JT Chapman 1938, MSI, with box 1988.146.3-6 & 45; "News," *APC*, 21 September 1938, 350.

indicates that many photographers used B&W film and, although colour film and processing were added to the basket in 1962, B&W continued to remain popular.⁶ The absence of developing chemicals in the RPI basket and the presence of commercial processing suggests that home processing was a minority interest. As colour processing at home was an even smaller interest, this chapter focuses on B&W processing.

Advice about photography chemicals

Photographers had many choices about which camera, film, darkroom equipment and developing chemicals to use. Additionally, the range of printing papers further expanded options by offering glossy or matt, soft or hard and tinted finishes. Photographers were able to navigate these choices by using articles in magazines, guides produced by manufacturers as well as independently authored textbooks and manuals, as well as speaking to knowledgeable sales experts or going to photography clubs. With all this information, home processors were able to find out what suited their needs regarding workflow, costs, and personal preferences for the appearance of the all-important end print. This freedom of choice is in contrast to the earliest days of photography. From the mid-1850s to the 1870s, amateur and professional photographers were required to be fully involved in every chemical process, from preparing plates, papers and prints, because there were no commercial services. Pritchard recounted how the introduction of the labour intensive, wet-plate collodion process,⁷ which relied on a highly flammable guncotton as a key ingredient in the sensitive coating of glass plates, was bemoaned by one photographer as making everything “too easy, too quick”. The subsequent availability of commercial dry plates, which were far more convenient than wet collodion plates, and an entire infrastructure of professionalised developing and printing services took the bulk of the chemical burden off photographers’ hands. Such changes in technology made photography easier, more convenient and attracted many more people to the activity.⁸ As home D&P

⁶ Jim O’Donoghue et al., “Consumer Price Inflation 1947-2004,” *Economic Trends* 626 (2006): 38-53.

⁷ As the name suggests, wet plates had to be used immediately, while they were still wet, which made them unsuitable for mass production. Dry plates could be commercially produced because they could be made in advance and stored.

⁸ Pritchard, “Who Were the Amateur Photographers?”.

became easier, the potential for photographers to be even further removed from chemical processes grew. What has been evident through research for this thesis is that, between the 1930s and the 1980s, commercial, convenient mixed products co-existed alongside the constituent chemicals, rather than displaced them, and users chose whatever suited their preferences.

This brief exploration of photography products and services confirms that the development of one's own photographs was certainly not a necessity. The regularity with which articles appeared between 1930 and the 1980s that encouraged amateurs to take up processing and stressed its simplicity provide another indication that it remained a minor interest. According to enthusiast Rex Hayman it was "a pity" that so few amateur photographers decided to process their own images.⁹ That home processing was pursued by relatively few photographers raises questions about what deterred people from or attracted them to the activity and "chemicals" can be an answer to both.

Safety had certainly been a concern before the 1930s, and is a subject that has been researched by photographer and historian Bill Jay.¹⁰ Jay has highlighted the frequency with which cautionary tales and health warnings were published in photographic journals during the Victorian period. He has noted that almost every week the photographic journals carried obituaries of photographers who had fatally interacted with their chemicals, either by accident or design. Among the causes of death, Jay has listed: detonation of flash powder; poisoning from pyrogalllic acid, a commonly used developer; poisoning from mercuric chloride (mercury bichloride, or corrosive sublimate) used as an intensifier; potassium bichromate employed in printing processes, and potassium cyanide, applied as a negative fixer and stain remover. Photographers were often warned and told of antidotes to accidental poisoning with potassium iodide or silver nitrate, but these chemicals could easily poison a less knowledgeable person who mistakenly drank them.¹¹

The idea of dangerous photographic chemicals in the home, particularly potassium cyanide, worried Ernest Neathercoat, a former president of the British

⁹ Rex Hayman, "Any Amateur Can Make Prints," *Guardian*, 21 November 1975, 21.

¹⁰ Bill Jay, *Cyanide & Spirits: An Inside-out View of Early Photography* (Munich: Nazraeli Press, 1991), 3.

¹¹ Bill Jay, "Dangers in the Dark," <http://cmcsart.weebly.com/dangers-in-the-dark-history-of-photography.html> (accessed 30 March 2014).

Pharmaceutical Society, so much that he urged photographers in 1926 to “let your local chemist deal with all dangerous photographic solutions”. This plea suggests that Neathercoat did not entertain the idea that photographers could use less harmful chemicals at home instead. Neathercoat imagined “innocent-looking” cyanide sticks “in the hands of an enthusiastic, unsuspecting schoolboy” and the “possible calamity to himself and to others”.¹² Despite these fears, such calamities associated with irresponsible cyanide handling were unrealised. Daily newspapers did not perpetuate Neathercoat’s alarm or portray photographers and their chemicals as posing a threat to the public, apart from themselves, because photographers’ access to potassium cyanide meant that they were prone to using this chemical for suicide.¹³

Jay has attempted to trace the origin of potassium cyanide’s use, because harmless sodium thiosulphate or photographer’s hypo had been available since photography’s earliest days and could be very satisfactorily substituted for potassium cyanide. Jay has pointed out that, throughout the 1890s “Magazines constantly affirmed that there was no good reason for potassium cyanide to be used in any photographic darkroom”.¹⁴ Nevertheless, they did not discourage its use, and rather than avoid particular chemicals, advice literature educated home processors about storage and handling methods that reduced risks. Protective gloves, goggles and masks were not advocated, signalling that the existing behavioural measures were adequate. Treating the user as responsible, rather than careless, promoted and perpetuated an attitude of respect towards both the chemical and the user.

Poisons legislation and rules, as mentioned in previous chapters, were put into practice to protect users from harmful chemicals, but were not discussed in photography magazines or books, indicating that their implementation did not greatly trouble photographers. These rules were to ensure that retailers sold potentially harmful products responsibly and that users were informed about the nature of the chemical, not to completely prevent the sale of potentially dangerous chemicals. It was quite normal in the 1930s for chemists to sell potassium cyanide, especially in summer

¹² E.T. Neathercoat, “Poisons in the Home”, 02 January 1926, 6.

¹³ Michael Clarke, “The History of Suicide in England and Wales 1850-1961, with Special Reference to Suicide by Poisoning,” (Ph.D., Oxford University, 1993), 317.

¹⁴ Jay, “Dangers in the Dark”, 19.

for photography while the weather was good, but also for other tasks such as killing wasps, and chemists recorded the sale, its alleged purpose and obtained the buyer's signature in their Poisons book.¹⁵

One of the points to consider about the domestic use of chemicals is the place in the home where they were used. Although housewives might have had a utility room in which to use stain removing chemicals, or a dedicated space in the kitchen where they stored them, and gardeners may have kept their herbicides in a shed, these places are less striking than the archetypal photographic darkroom. Professional photographers Margaret and Edward Chambré Hardman, whose house and studio is now toured by National Trust visitors, had two permanent darkrooms. The first was in the basement for commercial use, meaning it was always full of work for customers. The second was private, located upstairs near the couple's living quarters and used solely for leisure. Located in "Liverpool's Harley Street", the house had formerly been used as doctors' premises, meaning that sinks with running water were installed throughout. In a wealthy area of a city this was not especially unusual, but many ordinary urban dwellings did not have such ample provision in the 1930s and 1940s.¹⁶ Clean, plentiful water was important for rinsing chemicals out of negatives and prints, which improved their longevity. The extensively plumbed house allowed the Hardmans to easily accommodate both their profession and pastime.

In contrast, amateur home processors did not have such large, well-appointed or even permanent darkrooms, nor did they require such great volumes or variety of chemicals. Hobby magazines commonly published letters requesting and contributing details of modest, and often temporary, home darkrooms.¹⁷ When home processors had to share space with other householders, they were urged to be especially careful about avoiding contamination, usually in order to preserve the quality of their prints, rather than out of concern for their companions. Additionally, the staining nature of developers was a special hazard to domestic harmony. A particularly cautious user could put down sheets of newspaper if they anticipated that they might drip or splash

¹⁵ "Naval Officer's Suicide," *Hastings and St Leonard's Observer*, 13 June 1931, 13.

¹⁶ Glen O'Hara, *The Politics of Water in Post-War Britain* (Basingstoke: Palgrave Macmillan, 2017) Chapter 7 "Hot and Cold Running Controversy: Water, women and the politics of washing".

¹⁷ C.E. Maney, "A.R.P. Shelter as Dark-Room," *AP*, 03 February 1941, 135.

anything.¹⁸ Stained household furnishings caused upset and hostility, which was more problematic than any personally experienced chemical harm and could lead to photo processing being banned from the home.¹⁹ The problem of staining was so acute that when Ilford introduced a new developing chemical, phenidone, one of the advantages they promoted was that it was less likely to discolour fingers and clothing (and, therefore, any other domestic surfaces) than its predecessor metol.²⁰

As well as stains, odours from processing chemicals could impinge on the comfort of other members of the household. However, they did not necessarily indicate danger. Would-be home processor “H.Y.” wanted to use their bedroom as a darkroom but worried “Is the odour usually found in darkrooms inevitable and, if so, is it injurious to health?”. The smell was acetic acid, often used in the stop bath. The answer was reassuring and straightforward: “Ordinary chemicals have no fumes which can be dangerous to health” and the processor should “open the windows occasionally, bottle the fixer after use and throw away the developer, washing the dishes at the same time.”²¹ The vinegary smell was to be endured stoically as part of the hobby and dealt with through sensible housekeeping. Those processors who especially disliked the odour, or shared the domestic space with someone else who found the smell particularly unpleasant, could change which acid they used in their stop bath, for instance to citric acid. However, there were dangerous smells: the bitter almond odour of hydrogen cyanide gas, or the acrid waft of ammonia. These poisons and irritants particularly related to the inadequate disposal of solutions, so the common-sense answer to chemicals lurking and mixing in the sink was to flush them away with plenty of water. Ex-Ilford chemist and home processor Dave Butcher confirmed that although photographers remained very aware of this potential problem, the chemicals most frequently used in modern domestic darkrooms no longer presented this danger.²²

¹⁸ “How to Use the Johnson ‘Do-It-Yourself’ Outfit,” (London: Johnsons of Hendon, c. 1957).

¹⁹ “Bedroom as Darkroom,” *AP*, 18 October 1961, 610.

²⁰ “Ilford Phenidone: A Remarkable New Developing Agent,” *Ilford Trade Lit* MSI.

²¹ “Bedroom as Darkroom.”

²² Dave Butcher, “Ilford and Photographic Chemicals,” interview by Cat Rushmore (23 September 2015), 15:00.

That the chemicals were, on the whole, safe, was good news for home processors. Constraints on space forced photographers to make domestic spaces do double duty, and because bedroom darkrooms were not unusual among passionate photographers, they demonstrate that living in close confines to chemicals was tolerable and safe. Many photographers chose to keep and use chemicals in their bedrooms.²³ When young Dennis Morris got his own bedroom in the 1970s “the first thing I did was completely black out my room – the windows – with bin-liners and ... I built like a work surface. I had my enlarger and trays full of chemicals. So I was basically sleeping, breathing chemicals 24 hours a day... you know, I was just living in a darkroom.”²⁴ Although Morris mentioned that he was inhaling the chemicals, he suffered no side effects from the activity.

Morris, like many photographers, lived in close proximity to the photographic chemicals he used. In contrast, garden chemicals were kept in the shed, garage or utility room, and cleaning chemicals might be stored in a cupboard under the sink, although users were often told that they should be kept somewhere more secure. These locations were chosen partly so that the chemicals were near their sites of intended use, but also because the chemicals were to be kept strictly away from unintended users (such as children). Modern photographic chemicals were usually not dangerous, indeed less harmful than some cleaning chemicals and herbicides, which may explain why photographers chose to live closely with their chemicals.

Despite their proficiency with chemicals, photographers who were active between the 1930s and the 1980s did not necessarily begin processing because they were interested in chemistry. Instead, they wished to create impressive prints to treasure, display, or possibly even win prizes. However, enjoyment of the process was important to them, as were controlling costs and other people’s access to their images. The pursuit of the image that existed in the photographers’ imaginations was a major reason to at least print, if not also develop their own films, because a commercial photo processing technician would never know the effect that photographers had imagined

²³ Grace Robertson, “Oral History of British Photography,” interview by Alan Dein (27 October 1993 and 04 October 1993).

²⁴ Dennis Morris, “Staying Power Black Photographers Project,” interview by H.J. <http://www.vam.ac.uk/content/articles/s/staying-power-dennis-morris/> (accessed 01 November 2015).

when they took the picture.²⁵ The desired effect could be achieved through using particular chemicals, timings, or even through combining different negatives into the same image. As described earlier, by the 1930s, it was not necessary for photographers to process their own films and prints.

Photographers who handed over their films for developing and printing were described by home processing devotees as “lazy” or “ignorant”.²⁶ Therefore, users of photographic chemicals could be classified as not-lazy, and not-ignorant, as well as careful, meticulous and methodical. They had to be, otherwise they could completely destroy their photographs, or end up with highly unsatisfactory prints. Indeed, there were chemical threats to the photograph at every stage. Home processor Paul Carter explained that “Every photographer at some point in their career has poured their fix in first and completely wiped the film, so you know there’s always a danger.” The “element of chance” formed a large part of the attraction to home processing. “When you actually pulled the film off the reel and looked at it, there was just that thrill, that wonder that you got anything at all, that you didn’t open the back of the camera at the wrong time, that you didn’t put the fix in first and so on.”²⁷ When there were so many opportunities to make mistakes, home processors relished their successes.

Companies such as Burroughs Wellcome & Co, Kodak, and Johnsons, built their reputations on making successes as reproducible as possible: they produced and marketed packets of chemicals already weighed into the correct proportions. This presentation meant that users did not have to measure out chemicals, and the small amounts meant that they were affordable. The powders, because in this presentation they were always referred to as powders rather than chemicals, only had to be dissolved in water in the order specified on the packaging. In the 1930s, articles entreating photographers to take up processing using such powders appeared in the women’s and family sections of newspapers alongside recipes for teatime treats, household cleaning hints and news of Boy Scout jamborees. These articles presented processing as a

²⁵ “Article on Home Processing for Beginners,” *AP*, 08 November 1980, 100-101.

²⁶ Stanley W. Bowler, *Photography for Boys and Girls* (Liverpool: English Universities Press Limited, 1950).

²⁷ Paul Carter, “Using Photographic Chemicals,” interview by Cat Rushmore (31 July 2015).

satisfying hobby for children and adults.²⁸ Technical descriptions were not avoided, though in the limited space available the articles were unable to go into great detail. Emphasising the accessibility of photography, such articles recommended buying commercially prepared powder developers and fixers, and following the straightforward instructions that came with them. Household items such as soup plates and tumblers were used to contain the solutions, and the photography columns in newspapers did not mention cross-contamination as a concern. Nor were any dangers raised of poisoning, dermatitis or unpleasant fumes, which gave the impression that developing photographs was a safe activity, suitable to be done in the home by anyone, including women and children. However, although powders were suitable for use by children, advertisements did not mention children, as manufacturers did not want to appear to limit the relevance of convenient and easy-to-use products to this small audience.

In contrast to the relaxed, domestic approach to home processing promoted by newspapers, in 1942 Walter Shearcroft's popular manual of photography declared home processors to be "practical chemists".²⁹ Shearcroft expected his readers to use dedicated equipment, to weigh out chemical ingredients and mix up developers, stop baths and fixatives themselves, rather than utilise commercially prepared products. Likewise, in dedicated hobbyist magazines such as *Amateur Photographer* (AP), the many published formulae for developers brought the individual chemicals, rather than the prepared powders, into prominence. Nevertheless, AP deemed powders acceptable for beginners, or those developing only occasionally. Such products simplified decisions, avoided confusion and could get beginners interested in processing by quickly getting acceptable results.³⁰ Users of branded developing tanks, which held a certain amount of solution, chose matching branded packets of powders which made the correct volume and strength of developer for that device.³¹ The convenience of such powders meant that some home processors emulated this system of pre-weighed chemicals. AP

²⁸ "Photography for Girls," *Nottingham Evening Post*, 13 July 1936, 4; Camera Girl, "Develop Your Own Films," *Falkirk Herald*, 28 August 1937, 3.

²⁹ Walter Shearcroft, *A Practical Guide to Photographic Chemicals and Their Uses* (London: Fountain Press, 1942).

³⁰ Sigurd Moir, "The Importance of Being Accurate," *APC*, 21 January 1931, 47-48; "Readers' Questions Answered: Glycin Developer," *APC*, 29 June 1938, 761.

³¹ W.L.F.W., "With the Beginners," *APC*, 03 June 1931, 495-96.

suggested that photographers bought small screw-capped tubes from the chemist in order to prepare portions of developing powders in advance. Unlike paper or foil twists or envelopes, the tubes could be reused and would keep the chemicals dry, so in better condition.³²

Readers of home processing advice literature were directed to photographic dealers or chemists who could order chemicals on request. Although the magazine articles did not identify brands, they advised that processors should seek branded chemicals produced by photographic specialists, for which adverts abounded in the same publication. Shearcroft's manual of photography was less subtle as it urged readers to "BUY NOTHING BUT BRANDED CHEMICALS".³³ False economy was warned against: if good films and papers were used, then the developing and printing chemicals should also be high quality.³⁴ In fact, wasting materials through carelessness, rather than the unintended effects of the chemicals on the user or others who shared the domestic space, were the main concerns associated with using photographic chemicals.

Secrecy was another reason for home processing, and Graham Rawle has written about the blurred boundaries between artistic respectability and seedy pornography experienced by photographers of nudes. Rawle has found that the home processing of such images enabled these photographers to avoid unwanted confrontation and censure.³⁵ The privacy made possible by processing at home, however, was not grasped by all photographers as an option for avoiding judgement.

Social historian Erika Hanna has also suggested that the technical aspects of twentieth-century home processing allowed men to carve out a niche in a hobby for which manufacturers had been perceived as increasingly catering to women with lighter, easier to use cameras and frivolous colour snaps.³⁶ This is a tempting hypothesis, as we have seen that there was a difference in the presentation of home processing by the

³² "Ready-Weighed Developer," *APC*, 25 May 1938, 610.

³³ Shearcroft, *A Practical Guide*, 33.

³⁴ "Photography Need Not Be Costly," *APC*, 04 May 1938, 481.

³⁵ Graham Rawle, "Photographic 'Artistry' in 1950s Men's Magazines," *either / and* (16 June 2013) <http://eitherand.org/reconsidering-amateur-photography/photographic-artistry-1950s-mens-magazines/> (accessed 06 October 2015).

³⁶ Erika Hanna, "Reading Irish Women's Lives in Photograph Albums," *Cultural & Social History* 11, no. 1 (2014): 89-109.

mainstream media that addressed beginners, women and children, which suggested using prepared powders, and in specialist hobby magazines, which presented powders as a way to get started but assumed that ultimately photographers would progress to weighing out chemicals. However, in reality there was not a strict, gendered division between who used commercially prepared products and who used raw chemicals. Research for this chapter has revealed that men and women used both methods, although home processing was more often undertaken by men. Steven Gelber has written that business-like hobbies allowed men to claim space for themselves in the domestic sphere. Although he did not name home processing, the activity fits with Gelber's description of qualities that made particular hobbies attractive to men. The fact that processing photographs was rule-based, methodical, required (an appearance of) exactness, and involved record keeping, rather than the use of chemicals in particular, may have lain at the heart of the appeal.³⁷ Nevertheless, women were not deterred by chemicals, as esteemed photographers Grace Robertson, Elisabeth Chat, Jo Spence and Zoe Dominic all mentioned using them in their interviews for the British Library oral history of photography project. Manufacturers tended to avoid depicting a user in advertisements, thus making their products relevant to all potential users. Questions relating to gender will be explored further in Chapter 6. However, before then, the next section of this chapter focuses on the firms who manufactured and marketed photographic chemicals and developer mixtures in tandem, with the view of giving the home processor control over their images.

Companies such as Johnsons of Hendon, or Kodak for example, generated and maintained two parallel routes for home processors. One path, of powders and concentrates, appealed to those who sought simplicity and the other, of handling the individual chemicals, to those who wanted to master chemical manipulations as part of photography. Kodak directly addressed this in their magazine *Special*, saying that improvements in cameras, films and chemicals offered:

“a choice of two roads to the photographer. He can use the advantage offered to maintain his present standards with less effort. Or he can exploit these

³⁷ Steven Gelber, *Hobbies: Leisure and the Culture of Work in America* (New York: Columbia University Press, 1999), 2.

advantages to produce better results. We believe that the vast majority of *Special* readers will choose the latter path, thornier but infinitely more rewarding.”³⁸

This extract demonstrates Kodak’s awareness of their users. The bulk of adverts and articles in *Special* were about commercial preparations rather than individual chemicals. Commercial products relieved the user of some of the need for precision associated with weighing and measuring, which helped to achieve flawless prints. Nevertheless, Kodak’s broad range of developers, fixers and papers meant that there was more than enough freedom for home processors to personalise their results.

Although Kodak advertised D&P products in their own magazines, Kodak were best associated with the slogan used in their widespread camera advertising “You press the button, we do the rest”. Serious photographers used home processing to differentiate themselves from the trivialised snapping promoted by this slogan.³⁹ On the face of it, Kodak’s well known “we do the rest” campaign reinforced the division of activities between the domestic user and the camera company, by conveying the message that processing the image was not a suitable task for most people to undertake successfully or pleasurably. However, Kodak did not entirely wish to separate even their most basic users from chemicals, as shown in *The “Kodak” Magazine* which carried informative articles about camera techniques, photography careers, and adverts for Kodatone printing papers. Printing from commercially developed negatives was encouraged by Kodak, shown by the presence of adverts for printing papers in their magazines.⁴⁰ Processing only the prints, rather than negatives, was common for many photographers because it avoided much of the difficulty of handling film.⁴¹ Chemicals were mentioned in Kodatone paper adverts, which showed a smiling woman holding a contact print frame. The adverts encouraged users to vary the tone of their B&W prints by pre-treating the paper with “common table salt”. This undemanding chemical

³⁸ “Editorial,” *Kodak Special*, Spring (1959), 1.

³⁹ John Taylor, “Kodak and the ‘English’ Market between the Wars,” *Journal of Design History* 7, no. 1 (1994): 29-42; Marc Olivier, “George Eastman’s Modern Stone-Age Family: Snapshot Photography and the Brownie,” *Technology and Culture* 48, no. 1 (2007): 1-19.

⁴⁰ “Kodatone,” *The “Kodak” Magazine*, April 1929, inner cover.

⁴¹ Personal communication, email Peter Morris 20 January 2016.

treatment imparted a cooler tone instead of the warm, rich sepia achieved when the paper was used with photographer's hypo alone. The image of a woman and an easily available household chemical worked to demonstrate the simplicity of Kodatone paper.

However, although Kodak's adverts for processing products were essentially only seen by photographers who had already bought into Kodak's "club", because they did not advertise in more general amateur magazines, the idea that Kodak films could be processed at home was advocated by other firms. For instance, Black Cat cigarettes advertised in daily newspapers that cigarette coupons could be exchanged for Kodak films. The line in the advert "Seen these Daddy – Dick's just developed them" indicated that Dick, rather than Kodak's operatives, had developed the film.⁴² An audience who obtained goods through collecting cigarette coupons were sometimes also keen to reduce photography costs in other ways, including home processing. Although in Kodak's camera advertisements they suggested leaving negative processing to them, Kodak were not precious about this message and sustained their popular partnership with Black Cat from 1928 until 1934.

An example of a photographer who got their first camera through Black Cat coupons was writer and broadcaster Frank Muir. As well as controlling photography costs through coupons, he processed his own photographs. His father, an engineer, was not a heavy smoker, so collecting coupons took a long time.⁴³ As the adverts put it, coupons provided "double enjoyment", first of smoking then of taking pictures. Coupons were a way of converting an otherwise unproductive habit and arguably wasteful or selfish use of money, into valuable items that could be enjoyed by the whole family.

Young Muir entered photography competitions in order to win cash prizes with which he could continue to finance his hobby, as there was "not spare money for the parents to waste on films and processing". In 1938, processing an 8 exposure roll film could cost 6½ pence, plus small prints at around 2 shillings, whereas Johnson's MQ developer suitable for films and papers was only 3 pence and a packet of printing paper was approximately 1 shilling, both of which were good for at least two films, making

⁴² Dave Kenyon, *Inside Amateur Photography* (London: Batsford Cultural Studies, 1992), 16-17, 114.

⁴³ Frank Muir, *A Kentish Lad: The Autobiography of Frank Muir* (London: Corgi Books, 1998), 45.

commercial D&P more expensive.⁴⁴ Muir stated that he found the required chemicals cheap, though he did not specify whether he started from scratch or whether he used the ready compounded powders. The darkroom conditions that Muir worked in were very basic: he closed himself in the darkened kitchen and used soup bowls to hold his working solutions of hypo and developer.⁴⁵ Muir gave no details about storing, weighing or mixing chemicals, so it appears that he relied on commercially prepared products, but it is very hard to determine this fact from this brief, though highly typical autobiographical memory of this childhood hobby.

The preoccupation with the costs of photography and whether they could be reduced through home processing was a regular topic for articles in newspapers and magazines. However, it was rare that likely prices were given for the chemicals or compared to those of ready prepared mixtures, although the cost of cameras, which was the most expensive item required, was often discussed.⁴⁶ Stephanie Gilbert's article about taking up home processing, written for feminist magazine *Spare Rib* in 1971, was not unusual in its sporadic treatment of the costs involved. She primarily encouraged readers to develop their own films to increase their own knowledge and personal empowerment.⁴⁷ Nevertheless, saving money was a key feature of much of the magazine's content, which was attuned to the fact that many in their audience had limited budgets. Gilbert outlined the existence of liquid concentrates of developer and fixative, which were "less hassle" than cheaper powdered versions, listed several brand names to consider as options, and then recommended one of each with a price.⁴⁸

Having been instructed by two more experienced photographers, Gilbert suggested using "cheap running water" instead of buying any acids for a stop bath. She divulged more insider intelligence as to the nature of PhotoFlo', a product marketed to hobbyists to help rinse fixative from the negative: "Don't get talked into buying PhotoFlo' as sold in shops; is almost identical to wash-up liquid [sic]". This type of

⁴⁴ Prices from photographic dealer JT Chapman 1938, (MSI, Ilford Trade Lit); Johnsons advertising *AP* 1941.

⁴⁵ Muir, *A Kentish Lad*, 45.

⁴⁶ R.S. Turner, "Is Photography Expensive?" *AP*, 25 October 1961, 631.

⁴⁷ Stephanie Gilbert, "Developing Your Films," *Spare Rib*, no. 26 (1974): 30-31.

⁴⁸ *Ibid.*

product was offered by all the main photographic companies, and Gilbert's aim was to inform readers about the product so that they could think for themselves, rather than buy it because it was suggested by an authority figure in the shop. Gilbert advised purchasing the smallest quantities of developer and fixer available, as they did not keep once opened. When Gilbert contradicted herself by pointing out that buying larger amounts of chemicals was cheaper, she highlighted a common value for money dilemma faced by home processors.⁴⁹ The dilemma, especially for beginners, was that they wanted to keep costs down, yet could not accurately predict how often they would process and therefore whether they would use up the chemicals before they deteriorated, which was a waste and represented poor value for money. Gilbert's article explicitly rejected some of the products offered by photographic companies on the grounds that they could be substituted with items already available in the home, which sets it apart from other articles for beginners in hobbyist magazines.

Articles like Gilbert's, which intended to help a potential user decide whether investing in materials for home processing was right for them, yet gave them incomplete information, confirm an unwillingness to acknowledge all the costs involved in a hobby like photography. Acquiring the equipment for home processing was expensive, but the chemicals needed to sustain the activity were relatively inexpensive. In addition, what was affordable or a feasible trade-off between effort and cost was different for each user, and changed over time. For example, Carter started off preparing his own fixers and developers from scratch to reduce the costs of running his photography business from home, but quickly found that the pace of work demanded that he bought readymade mixtures to save time and ensure reproducibility.⁵⁰

Another aspect of home processing was "magic", a word often used to encapsulate D&P's appeal. Carter described the "magic of the darkroom", and Dominic thought "the best moment in the darkroom when the first traces of the image begin to come up" was "pure magic".⁵¹ The chemical magic experienced by these photographers was more immediate, spectacular and wondrous than that promised to housewives and

⁴⁹ *Ibid.*

⁵⁰ Carter, "Using Photographic Chemicals".

⁵¹ Carter, "Oral History of British Photography", track 1 of 4, 0:43:00; Zoe Dominic, "Oral History of British Photography," interview by Shirley Read (1996) track 2 of 8, 12.35.

gardeners. Unlike cleaning or weeding, developing film and photographs was not drudgery, so manufacturers of photographic chemicals did not have to give their products energetic, magical or fun names. Instead, photographic products had names which emphasised their chemical origins or their function. Table 5.1 shows the names of chemicals in the developer, their function and the brand names of commercial developers. For example, the suffix –ol suggests the presence of metol, or sometimes amidol, -phen indicates phenidone, while –fix describes the product’s function as a fixative. Advertising for developers prioritised usability, as can be seen from the reassuring words and phrases that shaped user expectations for the products.

An example of when usability was emphasised, for instance, was in 1941 Kodak highlighted the fact that their chemicals were soluble and that they had eliminated the risk of chemical dust. This was important because home processors understood undissolved chemicals in solutions, and dust-like chemicals in the air, to be the causes of fogged, spotted, flecked or otherwise damaged and inferior negatives and prints. Never mind that airborne chemicals could be inhaled, and that contaminated fingers could become irritated or even potentially poison the user, the need for careful and responsible chemical handling was always framed in terms of the quality of the negative and the final print, rather than the protection of the user.

Table 5.1: Branded developers advertised in AP emphasised functional names, usability but rarely showed images of users.

Date	Product	Usability words	Image of User
1931	Johnsons Azol	Simple, sure, correct, saves time and money, most fascinating	No user. Bottle, measure, film spool and tray
1941	PAC Super Degrainol	Wide latitude, freedom from fog, non-staining, non-poisonous	Text only
1941	Johnsons MQ packets	Economy, obtainable anywhere	No user. Show packets.
1941	Johnsons Meritol	Greatest most recent photographic chemical discovery, British, without toxic properties of Paraphenylenediamine, vital ingredient	Hand pulling back curtain to reveal bottles and tins
1941	Burroughs Wellcome & Co Tabloid Metol-Quinol	Ease, precise, fresh, quick, economy, no waste	Hand shaking out tablets from container
1941	Burroughs Wellcome & Co Tabloid Fine-grain developer	Excellent quality, quick, easy, economical	No user. Photo of pet rabbit
1941	Johnsons Fine Grain developer	Sure, secure, first, correct	Two men in suits looking at a developing tank /negatives

Date	Product	Usability words	Image of User
1941	Kodak (general)	Efficient, pure, accurate, tested, ready solubility, freshness, convenience, save storage space, portability, freedom from contamination, risk of chemical dust eliminated	Scientist in lab
1941	Kodak Kodinol developer	Seconds, exceptional, outstanding, versatile, economical, technically advanced, recent scientific research, convenient and trouble saving	No image of user. Photo of bottle
1960	Ilford Monophen developer and fixer	Foolproof, simplicity, child's play, automatic, no need for mixing messy chemicals, clockwatching, the answer to tedium	No image of user. Outline of bottle
1961	May & Baker Promicrol Cobrol Super Amfix	Race against time, fine finish Cuts exposure time, superlative Superb quality, two minutes High speed, concentrate, under two minutes, convenient time and space saving plastic Q-paks	No image of user. Sketch of racing yachts
1961	May & Baker Simprol	Develop and fix in one operation, glass bottle of concentrated solution, sachets of additive, vary the quantity used, adjustable, Technical Information department, made in England	No image of user. Photo of bottle and sachets
1961	May & Baker (general)	Quality control, resources of technical departments at your service, no extra charge	Male technical staff & scientist
1966	Johnsons Unitol Fix-sol:	Confidence, made in England New lighter unbreakable Rigidex container, plastic, easy to use, economical, convenient The most popular concentrated solution, smart new pack	No user. Photo of new bottle
1966	Paterson Acutol developer	Outstanding, brilliant, research, new methods, maximum, up-grade, concentrated liquid	No user. Photo of bottle and microscope
1966	Johnson Unitol: Solufin: Universol: M-Q pactums: Fixadon: Soluprint: Redifix:	Best results Consistently perfect keep for several months, first-class, all-round, small quantities quick, easy, powder research, exceptional, latitude rapid	No image of user. Sketches of equipment, not bottles
1966	Paterson Acutol range	Brilliant, unequalled, concentrated liquid, one-shot, reuse, exhaustion indicator, re-thinking, outstanding, excellent	No image of user, only bottles
1971	Paterson Acuprint, Acustop, AcuFix	Quality first Ensure best quality, concentrated liquids	No user, only photo of equipment/glass bottles
1971	Johnsons	Accentuate, illuminate All-round, time/temp tables w each bottle No made-up solutions hanging around Professional phenidone now available in smaller size – amateur Ever-popular, inexpensive, economy	No users, only photo of plastic bottles
1976	Paterson (general)	Today's formulae for today's films, Research, continuing improvement, pace, push to the limit, comprehensive instructions supplied	No user, only photo of scientist's hand holding glass bottle

Although care and attention enabled users to avoid many common darkroom problems, companies offered them chemical shortcuts. Johnsons said “Remember always if you have a photographic problem that Johnsons have a chemical for it”⁵² and the pages of hobbyist magazines were filled with user questions, product reviews and adverts for compounded chemicals which promised to correct errors. For instance, “Latitol” was a developer improver which protected against fogged negatives, and would “rescue” over and under-exposed prints. The name Latitol suggests “latitude”, a word used by photographers to describe the relative room for user error. It was a convenient product, which could potentially rectify minor darkroom errors, therefore it appealed to home processors who were aware of their inexperience or past mistakes, and were anxious not to waste materials and ultimately their time. Impatience was noted as a reason for using such products, as a quick chemical fix that could be adopted instead of having to improve one’s craftsmanship.⁵³ As seen from Gilbert’s tip about forgoing PhotoFlo’, some of these products marketed by photographic specialists, while helpful, were not strictly necessary.

The helpfulness of the retailer was paramount in enabling the user to negotiate the variety of chemicals and prepared products. “D.C.” wrote to the *AP* in 1944 puzzled that they could not find chemists with the necessary stock to follow formulae that the *AP* published. The response was that some of the chemicals were only used in photography, not medicine or pharmacy, so D.C. should try to find a dedicated photographic dealer or directly contact chemical suppliers. Assertiveness was encouraged: “If you cannot obtain ferric oxalate, potassium oxalate or potassium ferric oxalate from your local chemist, we suggest that you instruct him to order them for you”.⁵⁴

As the pronoun “you” suggests, photographers generally shopped for their chemicals themselves. However, photographic chemicals were also highlighted as

⁵² “Johnsons of Hendon Ltd,” *British Photographic Almanac* (1946).

⁵³ Ralph Lambrecht, “From Exposure to Print: The Essentials of Silver-Halide Photography Required for Long-Lasting, High-Quality Prints,” in *The Focal Encyclopedia of Photography*, ed. Michael Peres (London: Elsevier, 2013), 667.

⁵⁴ “Not Easily Obtainable,” *AP*, 07 May 1941, 427.

suitable for gifts because they were relatively inexpensive yet useful.⁵⁵ May & Baker promoted their products as such, and were featured in one of *AP*'s Christmas present guides. Gift recipients were expected to be "anxious to try" the latest products, Cobrol paper developer would "always find a use", and giving the newest version of a trusted product was "a safe bet".⁵⁶ One way of ensuring that a gift of photographic chemicals was a safe bet was to have a knowledgeable and approachable salesperson who could discuss the likely needs of the recipients and who was well informed about exciting new products.

Photographic dealers were encouraged to cultivate a good rapport with their customers. Kodak ran training courses for salespeople,⁵⁷ as did Ilford, who emphasised the need to know about the customers in order to best help them, as well as to encourage sales and repeat custom.⁵⁸ In anticipation of retailers broadening their market, and in acknowledgement that a child attracted to processing photographs could be a customer for their entire life, sales training material produced by Ilford ensured that children and young people were directly addressed as buyers and users of their product. The cross-generational users may have contributed to why cameras and developing kits were not included as "toys" in surveys by historians such as Kenneth Brown and Gary Cross, even though other hobby kits were presented as educational, self-improving, activities which prepared children for the world of work.⁵⁹ Ilford's training manual stressed that a high level of customer care was applicable whether the salesperson was dealing with amateurs buying small amounts, or bulk-buying professionals. Although large packs for professionals worked out cheaper for professionals, they were not economical for amateurs as the chemicals did not keep. For them, small packs were affordable and promised fresh, active chemicals (Table 5.1).

⁵⁵ "Gift Guide Editorial," *AP*, 22 November 1980, 98.

⁵⁶ "Gift Guide Editorial," *AP*, 06 December 1961, 877.

⁵⁷ Jo Spence, *Putting Myself in the Picture: A Political, Personal, and Photographic Autobiography* (London: Camden Press, 1986), 14.

⁵⁸ *No. 8 Salesmanship*, The Ilford and Selo Course of Photographic Salesmanship and Service (London: Ilford Limited, no date) MSI, Ilford Trade lit.

⁵⁹ Gary S. Cross, *Kids' Stuff: Toys and the Changing World of American Childhood*, (Cambridge, Mass: Harvard University Press, 1997); Kenneth Douglas Brown, *The British Toy Business: A History since 1700* (London: Hambledon Press, 1996).

Johnsons highlighted chemicals as the great leveller of photography in their adverts, even more important than the quality of the camera used to capture the image, by using the phrase “Chemicals always have the last word”.

Seeing the logo of a photographic chemical manufacturer also reassured the home processor that they had chosen the correct chemical, a fact that was especially important if the home processor purchased chemicals from chemists who did not specialise in photographic supplies, and who could misinterpret what a photographer wanted. “B.L.” from Devonport recounted making up what he believed to be a glycin developer, which had absolutely no effect. *AP* deduced that he had been sold “useless glycocoll”, known to pharmacists as glycine, and advised asking for chemicals by their full names or to see the bottle in order to check for the logo of recognised photographic chemical companies.⁶⁰ Asking for branded chemicals signalled to the vendor that the buyer intended to use the chemical for photography, and established that the buyer knew what they wanted.

The impetus for understanding what particular chemicals did was heightened when it was expected that the Second World War would divert photographic supplies away from hobbyists towards uses that benefitted national security. Pessimistic articles prepared readers for shortages of potassium bromide, potassium metabisulphite, potassium permanganate (all substitutable with the sodium equivalent), borax, as well as boric, citric and tartaric acids. Household chemicals were not suggested as alternatives, and photographers were advised to find developer formulae which enabled them to use the photographic grade chemicals they already had to hand, rather than attempt to substitute ingredients they lacked.⁶¹ However, Johnsons were keen to emphasise that photographic chemicals were not in short supply, and advertised them heavily, often on the front page of *AP* (Figure 5.1). In addition, these adverts often promoted the scales logo and proclaimed their chemicals’ affordability.⁶²

In the 1940s the purity of chemicals was emphasised in advertising with images of laboratories and scientists, an aspect complemented by references to up-to-date

⁶⁰ “Readers’ Questions Answered: Glycin Developer.”

⁶¹ Ivor Smith, “Chemicals in Wartime,” *AP*, 06 August 1941, 636.

⁶² “Johnson & Sons Manufacturing Chemist,” *AP*, 11 October 1944, front page.

research (Table 5.1). The Kodak advertisement (Figure 5.2) did not suggest that users seek raw chemicals, but listed seven reasons why photographers should choose the compounded products made from Kodak's pure, tested chemicals.

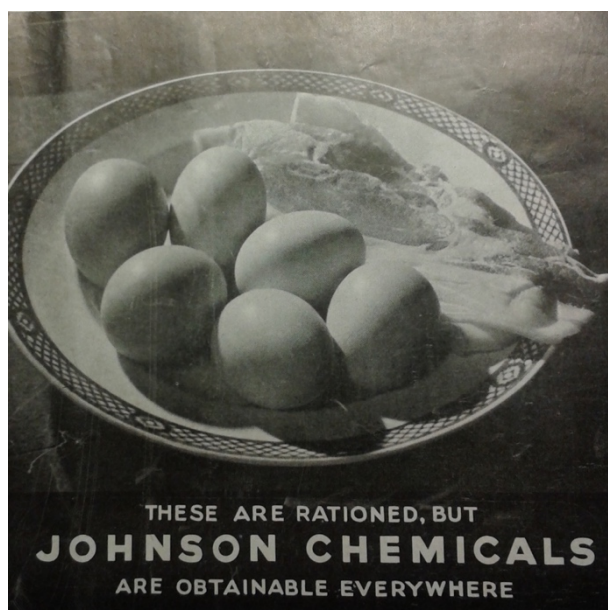


Figure 5.1: Although staple food items were rationed, Johnson assured users they could continue their hobby unhindered (AP, 06 December 1944, front page).

CHEMICALS *must* BE PURE

A black and white photograph of a scientist wearing glasses and a lab coat, looking intently at a piece of laboratory equipment. The equipment includes a round-bottom flask on a stand, with a vertical tube or pipette connected to it. Other glassware and bottles are visible in the background.

For developer solutions to act efficiently, the chemicals composing them *must* be pure. If they are not, the impurities may very seriously impair the negative quality and, still more frequently, upset the balance of the formula. In Kodak Packed Chemicals you have developers (and other photographic compounds) accurately prepared from *tested* chemicals—tested in the Empire's largest photographic factory. With purity and accuracy, they have many other advantages which may be summarised as follows:—

- (1) Convenience. (2) Freshness. (3) Ready solubility. (4) Saving in storage space.
- (5) Freedom from contamination. (6) Risk of chemical dust eliminated. (7) Portability

KODAK TESTED CHEMICALS

KODAK LIMITED, WEALDSTONE, HARROW, MIDDLESEX.

Figure 5.2: A scientist confirms the purity of Kodak chemicals (AP 30 April 1941 front page)

In addition to avoiding confusion between similarly named chemicals, *AP* advised using branded chemicals specifically for photographers instead of risking wasting printing-out paper by using substandard, unbranded chemicals. During the Second World War, paper was scarcer and more expensive than chemicals.⁶³ As an example of a tempting chemical substitution, Shearcroft described sodium carbonate, available in the home as washing soda. Washing soda was good enough for the menial tasks of washing up and cleaning floors, but the skilled technical use of developing photographs demanded a finer grade.⁶⁴

However, Shearcroft was over-cautious in his recommendation not to use this common domestic chemical, and editors at *AP* magazine had a short memory. In 1917, they had advised that washing soda was an acceptable substitute, provided the photographer tested the solution to find out how it behaved before committing all their work to it. The attitude had been that, if the risks were understood, the user was free to employ domestic sodium carbonate if that was what was available to them. Washing soda was one of the chemicals that Terry Dennett researched for a project on “survival photography” that used alternatives to branded photographic chemicals, an aspect of a new practical photographer’s handbook supported by artist Jo Spence and the Photography Workshop collective. Although their project was never finished, Dennett’s research began to popularise the use of “photographically useful” chemicals which might readily be found in the home. One of the reasons behind this project was to encourage photographers not to depend on photographic companies, who were distrusted because they “fetishized” photographic chemicals.⁶⁵ Spence did not define this supposed fetishization but it could be that she considered branded chemicals as “charms” required to conduct the magic of D&P, or that firms stimulated obsession, perhaps otherwise understood as brand loyalty. Photographers could be motivated to use household chemicals because the supply of dedicated branded photographic goods

⁶³ “Wartime Economies,” *AP*, 03 December 1941, 923; “How to carry on in 1942,” *AP*, 31 December 1941, 991.

⁶⁴ Shearcroft, *A Practical Guide*, 34.

⁶⁵ “War Chemicals,” *Amateur Photographer and Photographic News*, 05 November 1917, 291; Spence, *Putting Myself in the Picture*, 64.

had been interrupted, or even discontinued, for political anti-corporate reasons, or a DIY ethos of simply trying to use what was at hand.

Arguments against using raw chemicals were made in adverts for compounded products, and can be seen in Table 5.1's list of "usability words". These words and phrases, such as "tedium", a preoccupation with speed or time, and the desire to avoid "messy chemicals", give a sense of the problems associated with preparing D&P solutions from scratch. It is hard to say whether dissatisfaction with handling chemicals originated with users, or was planted in their minds through the promotion of increasingly convenient products, because magazine editors took care to air enthusiastic defences of both modes of working. Amongst home processors' testimonies, including that of a trained chemist, there was certainly a preference for using compounded products over working with individual chemicals, even if the photographers did not always mention brand names. Dominic, Carter and Butcher had all mixed their own developers from scratch, but preferred using prepared mixtures because it was faster and the results were more consistent.⁶⁶ The success of prepared developers when the constituent chemicals continued to remain available demonstrates that users definitely appreciated the convenience.

Convenience was evident in the presentation and packaging of branded products. Burroughs Wellcome & Company (Burroughs hereafter) tackled the problem of fiddly weighing by presenting photographic chemicals in tablet form. Their well-established line of tabletised goods under the brand name Tabloid meant that photographic chemicals were a logical extension to the range. Burroughs capitalised on the fact that their photographic chemicals were used during the British Antarctic Expedition in 1911, which demonstrated their reliability and ease of use in a British home away from home. Official photographer for the expedition Herbert Ponting became a model user who endorsed Tabloid chemicals in Burroughs' advertisements.⁶⁷ The tablet proved a convenient way for users to handle the chemicals, as the brand continued to be available into the 1960s.

⁶⁶ Dominic, "Oral History of British Photography"; Carter, "Using Photographic Chemicals"; Butcher, "Ilford and Photographic Chemicals", between 1.40 and 4.30.

⁶⁷ Herbert Ponting, "Letter from Ponting to Burroughs Wellcome & Company, October 1911," Wellcome Foundation Archive, 1911.



TRADE MARK

'TABLOID' BRAND

FINE-GRAIN DEVELOPER

This borax metol-quinol developer requires no increase in exposure. Negatives suitable in contrast, density and grain for successful enlargement up to 10 diameters can be obtained by following the development table times provided. One pair of products will develop one average roll film of eight exposures, $3\frac{1}{2} \times 2\frac{1}{2}$ in., or equivalent emulsion area.

1/6 per carton, from all photographic dealers

BURROUGHS WELLCOME & CO., LONDON

Pho. 1815

It's so easy & so sure—

WITH *Johnson's* **TANKS and CHEMICALS**

Secure perfect negatives by the use of Johnsons Tanks and Chemicals—and a Johnsons Developer.

The Adjustable Tank takes five popular sizes of film **18/6**

Time and Temperature Calculator - - - **2/6**

FINE GRAIN: First of the prepared fine grain developers introduced by Johnsons. Negatives developed with it give clear enlargements with well-defined image full of pictorial technique.

In 20 oz. tins, - **1/3** per tin.

AZOL: The Correct Developer, 3-oz. bottle makes 75-300 ozs. of solution **2/3**

M.-Q. DEVELOPER PACKETS: Convenient and economical to use. Making 16 ozs. **3/4** each.

Special Offer!
For 2/4 F.O. Johnsons will send you free one tin Fine Grain developer to make 20 ozs. enough for 4 or 5 spoons; one 4 oz. tin Acid Fixing to make 20-40 oz. solution; one packet M.-Q. developer, enough to make 56 prints.

Write to Publicity Dept. and ask for details of Johnsons Competitions.

JOHNSON & SONS Manufacturing Chemists LTD. HENDON, N.W.4

Figure 5.3: At the top, Burroughs Wellcome & Company Tabloid fine-grain developer showed off their results rather than the tablet formation, and below Johnsons aimed to please a variety of users with developers in three different forms: liquid, powder, tablets. (AP 24 September 1944, 2)

Johnsons became the sole distributor of Tabloid photographic chemicals in 1949, although Burroughs continued to make the product.⁶⁸ Johnsons also tabletised some of their own products, as seen in Figure 5.3, but also found other ingenious ways to help users. For instance, one of their powdered developer mixtures was contained in a tin where the lid doubled as measure, avoiding the need for users to do weighing out

⁶⁸ "Johnsons of Hendon Ltd.," *The British Journal Photographic Almanac* (1949): 40.

themselves. However, if users preferred, they could still weigh out an accurate amount. The provision of such a product, which was included in Johnsons' D&P outfit for beginners that they marketed in around 1964, demonstrates that user-friendly presentation was considered particularly suitable for amateur home users.

Johnsons' Pactum line of powders, the rectangular packets in Figure 5.3, fully replaced Tabloid by 1965.⁶⁹ Instructions for the tabletised chemicals indicate a reason for this change. Although Burroughs' aimed for easy solubility, users were told to immediately pulverise the tablets after adding them to the water and to stir the mixture until they were fully dissolved. Users were advised against using a thin-walled glass vessel, which conjures up visions of potential accidents brought about by the vigour needed to crush and stir the tablet into solution.⁷⁰ Undissolved chemicals could cause blotches on the film unless they were carefully filtered out, so manufacturers and users were keen to have a product that neither required this time consuming step, nor further eroded users' goodwill by appearing wasteful. Uncompressed powders were easier to dissolve, so in time displaced the tablets.

Presentation and packaging ensured that chemicals lasted, as well as were easy to use. Paper and cardboard packs were vulnerable to becoming damp. When repackaging them or the stock solutions that users had made, clear and accurate labelling was of paramount importance, with multiple authors describing how best to do it. However, in a departure from the usual fixation of home processing manuals on efficiency, an instruction manual by Wall suggested that bottles should only be labelled with chemical symbols, rather than plain names, in order to obscure their identity and uses from non-photographers. Wall's theory was that a suicidal non-photographer might know corrosive sublimate (mercuric chloride) to be a poison, but would not recognise "HgCl₂". However, he did not identify another more common domestic use of the chemical, its use in gardening, for instance to control club root. Nevertheless, Wall decided that chemically cryptic labelling would prevent any non-photographic uses of the solution, especially by despairing users. Wall also paid particular attention to the

⁶⁹ http://www.photomemorabilia.co.uk/Johnsons_of_Hendon/JoH_YearBook.html (accessed 14 October 2015).

⁷⁰ "'Tabloid' Brand Photographic Developers," 1950? instructional leaflet.

duration of a label and gave advice about methods for safely opening bottles, as stuck stoppers and corks were deemed the cause of many accidents encountered by the photographer.⁷¹

Although some manuals recommended a particular type of bottle, a Winchester, which could be bought from chemists, others suggested domestically available jam jars and other drinks bottles.⁷² Gin bottles were suggested as they were often squared, allowing the container to be easily distinguished by touch in the dim light of the dark room. The author of that particular piece of advice added a disclaimer that it was not his fault if people drank from the bottle, which should be clearly relabelled.⁷³ Not everyone diligently followed this advice about clarity, demonstrated in Figure 5.4, which shows a reused medicine bottle in MSI's collection. The reverse of the glass bottle is embossed "chest and lung mixture" and the chemist's original label of "tincture of quinine" is still partially visible under the added label and faded pen inscription of "Pot. Bichrom, Hydrochlo. Acid Intensifier".



Figure 5.4: Reused medicine bottle (author's photo, 26 August 2014, MSI)

Enthusiast C.E. Maney shared his "amusing experiences" of mistaking an unclearly labelled bottle for one in which he could store his used but not yet exhausted hypo solution. Instead, the storage bottle was a three-quarters full bottle of sherry and he wasted both his drink and his hypo. He declared that he had learned from experience

⁷¹ Edward John Wall, *The Photographic Darkroom* (London: Chapman & Hall Ltd, 1934), 46-47.

⁷² Bowler, *Photography for Boys and Girls*, 25.

⁷³ Ladislaus Andrew Mannheim, *Straightforward Developing: How to Get the Best out of Your Own Films* (London: Focal Press, 1949), 20.

to strictly separate beverages from darkroom materials and proclaimed that he had since moved his cocktail bar to a shelf further away from his workbench.⁷⁴

The importance of describing or showing packaging in advertisements and announcing packaging improvement (Table 5.1) makes sense when the role of proper packaging in preventing darkroom mishaps is considered. Choosing a branded preparation meant that photographers benefited from safe, functional and usable packaging, which reduced the likelihood of accidents that related to reused containers.

Although drinking hypo could make a photographer ill, it would be unlikely to cause permanent harm, but some of the chemicals used in the home darkroom were more harmful. C.K. from Feltham wrote to *AP* in 1941 to say “I use mercuric chloride and potassium cyanide... I understand that they are such intense poisons that mere contact of them with the skin is likely to be fatal”. This comment elicited the response that *AP* staff had personally used these chemicals without problems, having followed “common-sense” precautions. They listed these as ventilating the room to prevent “headaches” from inhaling hydrogen cyanide gas, ensuring there were no abrasions on the skin, not immersing fingers for a more than a few seconds at a time, and rinsing immediately.⁷⁵

When users were alerted to their need for responsibility and care when handling the chemicals, for instance not to smoke, eat or drink in the darkroom, and to wash one's hands well, these recommendations were all dealt with in terms of obtaining decent photographic results rather than personal safety. However, not everybody strictly followed these instructions. For instance, many photographers smoked in the darkroom, even using smoke to “dodge” during enlarging, when the smoke scattered the light and softened part of the image, achieved otherwise by waving a piece of paper or card between the projected image and the printing paper. Unless alcohols were used to dry negatives, most darkroom chemicals were not flammable. The prospect of dropping ash and spoiling the work, or putting one's hand to the mouth and transferring chemicals, were greater hazards than fire. Eating in the darkroom could involve accidental ingestion of chemicals, but when Dominic recalled that during the 1960s she had a Baby Belling cooker in her home darkroom and used to have fry-ups in there, her

⁷⁴ C.E. Maney, “A.R.P. Shelter as Dark-Room,” *AP*, 03 February 1941, 135.

⁷⁵ “Poisons,” *AP*, 18 June 1941, 529.

primary concern was for the protection of her negatives and prints from sputtering grease.⁷⁶

Chemicals and the skin



Figure 5.5: This photograph from AP 1938 shows bulldog clips being used as makeshift handles which also keep the film flat to pass it evenly through the solution and to hang it as it dried. Typically, gloves are not shown.

Grease and enzymes from fingers were of less concern to photographers than the risk of accidentally contaminating their films and prints with traces of photographic chemicals on their hands. Figure 5.5 shows a barehanded processor manipulating their film in the chemical solution. Throughout the period of study, this image was replicated, communicating and reinforcing a feeling of indifference towards skin contact with the chemicals. Gloves were not usually recommended to protect the film from the processor, nor were gloves advised to protect the processor from their chemicals. Instead, home processors washed their hands repeatedly during processing to prevent contamination. However, magazine writers and manual authors did not take an actively anti-glove stance, as demonstrated by the lack of negative comments about the loss of sensitivity or dexterity associated with the use of gloves. Gloves were in fact hardly mentioned at all,⁷⁷ although plenty of other chemicals or gadgets were described as

⁷⁶ Dominic, "Oral History of British Photography".

⁷⁷ G.H.W. Randell, "Letters to the Editor: Using Rubber Gloves," *APC* (14 September 1938): 311.

methods to avoid contact with chemicals, because one of the chemicals used by home processors, metol, was notorious for causing dermatitis. B&W processors were regarded as being more likely to "slosh about" in metol developers, whereas colour processors could not indulge in "such light hearted frivolity" as the harsher chemicals they used required more respect and certainly the use of rubber gloves.⁷⁸ For instance, the risk of cancer, which in the 1930s became associated with the azo dyes necessary for colour processing, was readily signalled to photographers, not that this dissuaded everyone from developing colour photographs.⁷⁹ Despite knowledge of cancer risks, the health of researchers and processors was not included in Jack Coote's history of colour photography.⁸⁰ This omission is unsurprising in histories of progress such as Coote's which focus on the technologies rather than their users.

Attitudes to physical contact with photographic chemicals varied greatly between users. C.J. Henderson wrote in 1938 that he was "astonished at the amount of dabbling" photographers did in their solutions, citing as potential outcomes the damage to photographs through chemical contamination and chapped hands from repeated wetting and drying in winter, but not chemical harm. Like many correspondents who shared their answers to photographic problems via the *AP*, Henderson advocated crafting homemade gadgets and a methodical system of working.⁸¹ However, if the tongs were not adequately rinsed, or if a different pair was not used for each solution, the tongs could contaminate and mark the prints. Confident in the quality and consistency of the Ilford chemicals he used, Butcher chose neither to wear gloves, nor to construct tools of his own. However, he made sure to minimise contact with the chemicals, stating that he got eczema if he worked for too long or too many days in a row.⁸² For a habitual nail biter like PU80, it was safer and more comfortable to avoid all direct contact with photographic chemicals. They used gloves and tongs to prevent ingesting residual chemicals and the painful stinging if chemicals got in at the nailbed or

⁷⁸ Geoffrey Lilley, *Make Your Own Darkroom for Colour Printing* (London: Fountain Press, 1962), 82.

⁷⁹ Carter, "Using Photographic Chemicals".

⁸⁰ Coote, *The Illustrated History of Colour Photography*.

⁸¹ C.J. Henderson, "How to Keep Your Hands Dry When Making Enlargements," *APC*, 07 September 1938, 338.

⁸² Butcher, "Ilford and Photographic Chemicals".

broken skin.⁸³ Sometimes chemicals caused finger nails to “shrivel up” and “fall off”, which happened to Carter’s wife Henrietta when she helped him to prepare sepia toned prints to meet a deadline. Described as an “intrepid soul”, Henrietta stopped work for the night but continued the following day, wearing gloves. Carter considered himself lucky that he was not allergic to any of the chemicals he worked with, although they were not without other effects. He recalled that even though he washed his hands as soon as he got anything on them in the darkroom (in order to prevent cross contamination or finger prints on paper), his clothes and lab coats eventually developed holes where he wiped his hands dry afterwards, the result of the acetic acid residues that slowly ate away at the fabric.⁸⁴ These examples of dermatitis and damaged clothes represent the diversity of users’ physical experiences of using chemicals. Two chemicals which affected the skin are studied next.

Metol and Phenidone

Photographers referred to the peeling and cracking of skin caused by metol as “metol poisoning”, a somewhat dramatic name for dermatitis, as the effect was not systemic but confined to the skin. There was great awareness of, and action taken to deal with, metol poisoning. Photographers described their painful symptoms in letters to *AP*’s queries service, which were answered in the Readers’ Questions section of the magazine with a diagnosis of metol poisoning, advice on working methods and soothing remedies to alleviate the condition.⁸⁵ Metol began to be used by photographers in 1891, and sensitivity to it became apparent soon after. Despite the high frequency with which metol poisoning was discussed in photographic journals from the 1930s and onwards, it barely featured in medical journals. However, doctors who were amateur photographers and home processors were familiar with metol poisoning. For instance, Frank Neubert was incredulous when it was suggested in 1965 that home processors were oblivious to the risks involved when using monoethylparamidophenol sulphate [metol] and paraphenylenediamine, in colour developers as “they had always been aware of the danger of metol poisoning” from B&W developers. To Neubert, it was obvious that

⁸³ Observation during personal communication, PU80 30 July 2015.

⁸⁴ Carter, “Using Photographic Chemicals”.

⁸⁵ F.J. Mortimer, “Topics of the Week: Metol Poisoning,” *APC* 23 February 1938, 303-04.

photographers would apply their knowledge about metol poisoning and because colour kits contained the same allergen, they would understand the risks associated with the new colour kits.⁸⁶ In the case Neubert responded to, allergic reactions to photographic chemicals had been rediscovered with the release of a new range of easy-to-use amateur kits for colour developing, while the issues processors had long experienced with B&W developers had apparently been overlooked.

Developing metol sensitivity was considered bad luck as “only one or two photographers in every thousand” were affected. The chemical was not blamed, but rather an inherent individual sensitivity, akin to being allergic to cats. Metol poisoning was an allergy that could be apparent from its very first use, or it could suddenly arise perhaps after 20 years of unproblematic use. The *AP* also reported how bad darkroom habits, such as rubbing one’s face with metol-contaminated hands, could lead to the loss of moustache, eyebrows and eyelashes through metol poisoning.⁸⁷ Rather than advise the complete avoidance of the chemical and cause unfortunate photographers to lose access to a very useful developer, suggestions included substituting amidol for metol to develop prints, or the use of a developing tank, instead of a tray, to contain the metol. Very rarely surgeons’ rubber gloves were suggested, along with complicated instructions because “the average person does not know how to use them”, or photographers were recommended to craft tools to help them manipulate papers and film.⁸⁸ Other than choosing a developer without metol, using tools, or protective gloves, the prevention of dermatitis also had chemical remedies: processors could use a barrier cream or rinse their fingers before and during development in a dilute hydrochloric acid solution.⁸⁹ The discomfort of metol poisoning is clearly the kind of cost that Stebbins has identified in his studies of leisure, which instead of ending involvement in a leisure activity, become

⁸⁶ Frank R. Neubert, “Skin Disease from Photographic Colour Developers,” *BMJ* 1, no. 5486 (1966): 542.

⁸⁷ F.J. Mortimer, “Topics of the Week: Metol Poisoning,” *APC*, 23 March 1938, 303-304; J.H., “Readers’ Questions Answered: Developer Poisoning,” *APC*, 06 April 1938, 397.

⁸⁸ G.H.W. Randell, “Letters to the Editor: Using Rubber Gloves,”; Henderson, “How to Keep Your Hands Dry When Making Enlargements”.

⁸⁹ C.I. Jacobson, *Developing: The Negative-Technique*, second edition (London: The Focal Press, 1942), 267; L. B. Bourne, “Prevention of Industrial Dermatitis,” *BMJ* 2, no. 4371 (1944): 512.

an obstacle to be overcome and make the eventual sense of achievement even more pronounced.⁹⁰

The awareness of skin problems and sensitivity was highlighted in publicity for Ilford's new developer chemical, phenidone, when it was marketed in 1953 as a safer substitute for metol. An advantage of phenidone was that it did not need the "obnoxious" alkali required to create optimum pH conditions for metol, which made the solution less aggravating to home processors' skin. Phenidone itself was encouragingly described as "one of the least toxic [developers]" and "unlikely to cause dermatitis with normal users", as well as being usable by those already suffering from metol poisoning.⁹¹ Although the promotional material highlighted the aforementioned user-centred reasons for the switch, Ilford were silent about the advances in chemical engineering which meant that phenidone could be produced more easily than when it was first discovered, nor did they mention the shortage in 1950 of sulphur, which was required to make metol.⁹² It was pressure to economise on sulphur, rather than to improve user comfort or safety, that was the motivation behind Ilford's introduction of phenidone as metol's substitute.

To become allergic to chemicals was unlucky, but it did not necessarily deter or prevent people from working with them; they either changed products or took precautions seriously. Carter's darkroom assistant worked with him for 20 years despite having a sensitivity to photographic chemicals, which shows that the issue was not insurmountable.⁹³ Metol continued to be used in prepared developers, and chemicals such as phenidone were promoted as improvements or substitutions but not as replacements. There was no compulsion, no sense that regulatory pressures could snatch away such useful but potentially harmful chemicals such as metol from photographers, who were usually considered to be informed and responsible users who were keen to produce great photographs which depended on their carefulness.

⁹⁰ Stebbins, *Leisure and Consumption*, 20.

⁹¹ "Ilford Phenidone: A Remarkable New Developing Agent," 1953, *Ilford Trade Lit.*, MSI.

⁹² Hercock and Jones, *Silver by the Ton*.

⁹³ Carter, "Using Photographic Chemicals", first 5mins.

Photographers were used to receiving safety information about chemicals directly from the chemical companies themselves and the experiences of other photographers shared through magazines, not via academic publishing outlets. When firms communicated about safety and optimum use in the form of written and illustrated instructions for users, users knew that they could trust the information to benefit their negatives, their prints, and their own health. Butcher, who worked as a research chemist for Ilford from the 1980s onwards and became involved in the photographic industry's Health, Safety and Environment group, pushed successfully for product labelling and warnings to reflect the actions of the chemicals in the concentrations as they were presented to the user in the product, rather than as individual components.⁹⁴ This detail meant that users were not prevented from using chemicals that were harmless in the small amounts that they were present in compounded products for photographers, even though they were harmful in high concentrations.

The realistic approach to chemicals promoted at Ilford is in contrast to the information presented in *OverExposure*, one book among several that were a response to the American implementation of workplace guidelines on exposure to carcinogenic substances, realised by the Occupational Health and Safety Administration (OSHA). Many of the chemicals now highlighted as dangerous had been in use for many years. Photographers rejected the classification of common and useful substances as hazardous, based on the fact that, as far as they could see amongst their acquaintances, the chemicals were harmless when used sensibly. At the root of the differing attitudes to riskiness, was the rigid application of OSHA's industrial chemical safety frameworks, established to manage commercial transport of chemicals, continuous workplace exposures, employee health, compensation claims and high dose carcinogen screening methods, which bore little resemblance to how photographers used the chemicals. Dosage information was not presented in the context of the use of chemicals for home processing, and relevant information from photographic manufacturers who had compiled data on their employees and users over long periods of time appeared not to have been taken into account. This further discredited the books, which were viewed as

⁹⁴ Butcher, "Ilford and Photographic Chemicals".

an exaggeration of the hazards faced by photographers, resulting in seasoned photographic processors dismissing them. For example, Richard Henry added a chapter to his 1986 edition of *Controls in Black and White Photography* which derided the ultra-cautious views about the safety of staple photographic chemicals.⁹⁵ However, a risky activity that photographers did not argue about was the use of chemical flash, which the next section examines.

Flash chemistry

As well as developing films and photographs, photographers could also use chemicals to illuminate their subjects or even to expose prints. Magnesium, as either a strip or a powder burns with a bright white light, which photographers found especially suitable. Magnesium powder mixed with an oxidising chemical, such as potassium nitrate or potassium chlorate, formed the basis of flash powder recipes. Commercial flash powders, magnesium strip and the accessories needed to dispense and use them are over-represented in NMeM's Kodak Gallery in a way that suggests that these were the only chemicals photographers used between the 1930s and the 1980s. The prevalence of these chemicals in museum displays maps partly onto the presumption that explosions are the only interesting and engaging part of chemistry. However, flash chemistry is important because it encouraged photographers to use their cameras all year round.

In the dark, wintry month of January 1931, Johnsons ran an indoor photography competition which promoted the use of their flash powder. Photographers were invited to send away a shilling postal order to obtain a trial box of powder, with instructions, then to enter their results in the competition.⁹⁶ Without the use of flash for indoor photography, hobbyists were restricted by very short daylight hours and bad weather for outdoor photography in winter. Alternatively, magnesium ribbon could provide the light for contact prints. This illumination was especially suitable in low wintry sunlight because it allowed the photographer to work faster and complete the task before their

⁹⁵ Richard J. Henry, *Controls in Black and White Photography*, second edition (Boston: Focal Press, 1986), 39-43.

⁹⁶ "Johnson & Son Cash Prizes for Indoor Snaps," *AP and Cinematographer*, 14 January 1931.

developer got too cold or oxidised.⁹⁷ Figure 5.6 shows a photographer sitting with a contact print frame in one hand and her magnesium ribbon holder in the other. Also seen are her clearly labelled developer, wash and fixing trays into which she will put the print, using tools with which to avoid dabbling in the solutions, when it has been exposed to the bright white magnesium light.



Figure 5.6: An inch of magnesium ribbon protrudes from the holder next to a lit candle (1930).⁹⁸ © British Library Board, *Kodak Magazine*, January 1930.

Another use for flash was the enduring vogue for silhouette pictures, usually cut out freehand. Flash photography made this art-form accessible to less artistically talented people. Although using a camera capable of taking detailed photographs to generate such a simple image might seem counterintuitive, it was another way of using the technology to obtain a pleasing and fashionable result. Kodak, who of course made both cameras and flash powder, published instructions for taking silhouette pictures, along with ideas for scenes or poses in their magazine for photographers. The amount of flash powder was given in unscientific, domestic terms, such as “the amount that can be heaped upon a sixpence” or for a larger amount “upon a penny”. Like Kodak’s advertisements which presented flash powder as “simple, safe and very efficient”, these

⁹⁷ “Two Technical Tips: Magnesium Ribbon,” *Kodak Magazine*, January 1930, 12.

⁹⁸ “Helpful Hints Series,” *Kodak Magazine*, March 1930, 46.

instructional articles did not include any particularly alarming warnings. Instead, they relied on a common-sense approach to safety which included reminders to “warn your sitter” and to avoid using flash powder too near anyone’s face, but without suggesting an appropriately safe distance.⁹⁹

In comparison, *AP* tended to give amounts for flash powder in grains, a precise weight, as well as detailed information on how far away the flash should be from the subject, though these were framed in terms of optimum picture-making rather than safety.¹⁰⁰ When “G.D.C.” from Everton wanted to know whether they could break up the lumps in old flash powder, the respondent was horrified: “We advise you on no account to do anything of the kind... with any form of friction it is liable to be dangerously explosive”.¹⁰¹ Preparing the flash compound required powder A to be combined with powder B. Kodak suggested placing the powders on smooth paper, then mixing with a paper knife made from bone or wood.¹⁰² Therefore, preparing the mixture would normally involve some amount of friction. The choice of bone or wood, rather than metal, suggests that they were used to avoid accidental explosion, but this was not spelled out for the user. Another common method was to package the powders in small tubes, shown in Figure 5.7, and then to shake the tube to mix the powders together. Both these examples indicate that manufacturers withheld potentially alarming information about misuse, so even photographers keen enough to read *AP* could have been using flash powder without full knowledge of its dangers, or how to handle it appropriately.

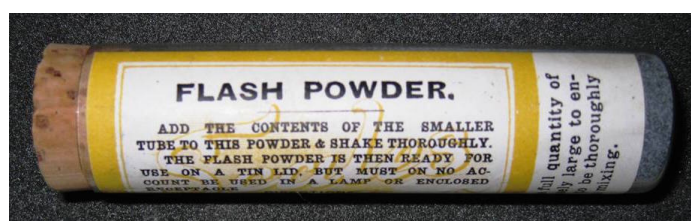


Figure 5.7: Vial of Johnsons flash powder, showing the instruction to “shake thoroughly” to mix. 1920s-30s. (object number 1990-5036/3609/2/1, NMeM © Science Museum / Science & Society Picture Library)

⁹⁹ J.E. Archbald, “Flashlight for Fun,” *Kodak Magazine*, December 1929, 206.

¹⁰⁰ Eric W. Sykes, “Overcoming Wartime Snags,” *AP*, 18 June 1941, 514.

¹⁰¹ “Answers to Correspondents: Old Flash powder,” *APC* (07 January 1931): 22.

¹⁰² Kodak Amateur Flash Powder (1990-5036/6623), NMeM, Bradford.



Figure 5.8: A box of flash bulbs (1935) which clearly lay out the disadvantages of flash powder. (object number 1979-0486 © Science Museum / Science & Society Picture Library)

Willingness to ignite explosive illumination sources indoors suggests that flash users were adventurous, as the powder could not always be relied on to behave as expected. By the 1930s, flash powder was competing with electrically ignited glass bulbs which contained magnesium, zirconium or aluminium foil, generating brightness without an exposed flame. Flash bulbs introduced convenience because they held consistent quantities of chemicals, and trapped the smoke and ash from the burnt foil, so were a physical barrier between the user and the chemical. The bulb packaging, shown in Figure 5.8, listed the reasons why bulbs were an improvement on flash powder: “No smoke, no fumes, no flame, no noise, no danger”, “Can be used anywhere, at any time, by any one”, which explicitly linked flash powder to danger. Bulbs were at first adopted by press photographers, and amateur photographers continued to use flash powder and magnesium strips, which were both more affordable.

Continued demand and general availability of flash powder into the 1940s meant that the product was included in the list of Prohibited Chemicals (1941).¹⁰³ The list was intended to monitor and control sales of chemicals that could be used by saboteurs in homemade explosives, and this list was previously encountered in the section on the herbicide sodium chlorate in Chapter 4. Flash powder stands out on the list because it is a mixture, not a chemical element, nor a compound. Also on the list was potash of

¹⁰³ “Retail Sale of Certain Substances, Appendix A” 1941, 875082/2 War Office (MI5) Sabotage etc. TNA.

nitrate, or potassium nitrate, and potassium chlorate which were ingredients in photographic flash powder. Magnesium powder was not listed separately. No further information was offered about how often flash powder was used by photographers, or the likelihood of it being used by a saboteur who had so many products to choose from.

The proposed wartime tightening of flash powder sales did not generate discussion in the photographic press, possibly due to censorship or because photographers did not feel deprived. Sales were not stopped, but the retailers were urged to consider the amount they were selling and to whom. How seriously retailers took the list of 37 prohibited chemicals varied geographically, with retailers in locations that had seen bombing, such as Coventry, Sheffield, Birmingham and Bristol, more interested in the scheme than in areas that had not been bombed.¹⁰⁴ The level of interest did not only relate to enemies as defined by the Second World War, as the Irish Republican Army (IRA) was also carrying out a campaign. At the end of May 1939, Coventry was targeted by the IRA who used improvised explosives made from flash powder. These bombs were hidden in four locations around the city, but were found and made safe before they exploded. This attempt was not Coventry's first encounter with the IRA, but reporting on the use of "flash powder" was a new and noteworthy development which domesticised the chemical involved.¹⁰⁵ Despite the perhaps surprising use of a domestic chemical for such a potentially harmful act, there was no further comment on it in the papers, and none revealed in historians' analyses of either IRA activities. In contrast, in the city of Oxford, which was left untouched by any kind of bomb, retailers refused to sell anything on the list, not to protect the nation, but because "they would rather not be bothered with completing forms".¹⁰⁶

Despite these potential restrictions, flash materials did not appear amongst the hard-to-find items that *AP* prepared readers to deal with or that their readers reported. In all probability, as most photographers used flash materials responsibly, the amount

¹⁰⁴ A.R. Bosanquet, "Report on the Control of Certain Substances Which Might Be Used for Sabotage Purposes, During the War," 1945, HO144/23246, TNA.

¹⁰⁵ "More Bomb Outrage Attempts," *The Coventry Herald*, 03 June 1939, 4; HO45/11240 Cover page, minutes War Office.

¹⁰⁶ "Extract from Minutes of Special Branch Conference (Regional) Held at Reading on 29 April 43," HO144/23246, TNA.

any individual needed to buy was not large enough to constitute a significant threat. Tins of Johnsons' flash powder contained one, four or eight ounces. One ounce of flash powder could illuminate approximately 43 individual portraits. Larger groups demanded more illumination, using around six grams of powder. However, even these small quantities could be dangerous, and caused experienced users to be wary. Dampness was a problem as it caused flash powder to detonate "like a small grenade" rather than provide light.¹⁰⁷

At other times, flash powder got into the hands of inquisitive users who were not photographers, and where, inevitably, it was harmful. Six-year-old Dennis Howling was thought to have thrown a tin of flash powder into an open fire, which injured him and broke all the windows of the family home, and some of the neighbouring houses. Dennis' father was unsure of what exactly had happened, or how his son came to be handling the explosive mixture.¹⁰⁸ Leslie Wood, who was 17 years old, had broken into a shop's showcase with his friends and stolen fishing tackle, then displayed further recklessness when he piled up flash powder and stood over it to light it. He was burned quite badly in the explosion.¹⁰⁹

Nevertheless, despite these misuses and accidents, flash powder was not subject to further restriction once the Prohibited Chemicals sales monitoring ceased. Flash powder was used well into the 1960s but some of the responsibility for handling the chemical was removed from the user. From 1952 the company Photopia presented flash powder in the form of "buttons" as an easier and safer alternative to mixing powders from tubes A and B. The buttons were portions of flash powder contained in cardboard that were ignited electronically. Photopia's CEO, Charles Strasser, claimed that their success prompted price reductions in electric light flash that marked flash powder's death knell.¹¹⁰ Flash powder and flash buttons continued to be in demand until electronic flash technology advanced to a point that using it was cheap and easy to manage.

¹⁰⁷ <http://photography.tutsplus.com/articles/a-brief-history-of-photographic-flash--photo-4249> (accessed 02 October 2015).

¹⁰⁸ "Boy Injured in Explosion," *Dundee Evening Telegraph*, 30 September 1927, 4.

¹⁰⁹ "Exploded Flash Powder," *Dundee Evening Telegraph*, 27 December 1939, 4.

¹¹⁰ Charles Strasser, *From Refugee to OBE* (Milton Keynes: AuthorHouse, 2012), 47.

That flash powder was used into the 1960s demonstrates that it remained useful as an affordable and effective method of lighting. Then, as electronic flash became more widespread, powder became a curiosity among photographers. The additional uses of flash to create silhouette images or as the light source for exposing prints also ceased to be recommended, leaving flash as only a method of illuminating scenes. Photographic flash powder was not included in the parliamentary discussions on the bangers and bombs which were constructed by and injured children, as seen in Chapter 4 with sodium chlorate. Although legislation was enacted in 1976 to prevent children under 16 years old from buying “explosives, including fireworks”, photographic flash powder was not explicitly named and only commercial fireworks were discussed.¹¹¹ The question of age had not entered into articles or letters in photography magazines, so it can possibly be considered an insignificant issue. Flash powder and magnesium escaped formal regulation, instead becoming less desirable compared to electronic flash, and less available as manufacturers and individual retailers found decreased demand to stock it. In contrast, a chemical which came under scrutiny and removed from the market, carbon tetrachloride, is revisited in the next case study.

Carbon tetrachloride

Carbon tetrachloride (CT) appeared in Chapter 3 as a solvent to remove grease from fabrics, but it was also used by home processors. Including CT in a study of photographic chemicals enables comparison of how different groups of users understood and handled a useful, but potentially toxic, chemical. It was not an essential chemical, but when CT was mentioned, it was only ever as unbranded “carbon tetrachloride”. Specifying the chemical name suggests that photographers should seek purity rather than use brands marketed for household cleaning which may have had additives. Stipulating CT, instead of Thawpit for instance, also indicates that the exact chemical identity of branded household chemicals could be hard to discern.

CT appeared as a substitute for benzene in Kurt Jacobson’s 1942 book and for cleaning negatives in his 1976 manual, although it was not included in his other

¹¹¹ “Explosives (Age of Purchase &C) Act 1976,” London: Her Majesty’s Stationery Office, 1976.

numerous books and neither was it associated with alarming warnings.¹¹² Aaron Sussman's 1963 *Handbook* recommended using CT to clean negatives in order to avoid streaky or spotted prints, and as one of five different ways of effecting repairs to scratched negatives. Sussman gave the caveats that it was "a deadly poison", that it should be used in well ventilated spaces, and only if the photographer did not have any abrasions on their hands. This final point was not a precaution that had been listed in any of the other sources about using CT domestically, although it is logical because it was absorbed through skin, but neither gloves, tongs nor tweezers were suggested as a way of avoiding contact with the chemical. The alternatives to CT offered by Sussman were glycerine, Vaseline, Refractosil (a dedicated scratch repairer of unspecified composition), with baby oil added as an option in the 1973 edition.¹¹³ When faced with these innocuous and readily available materials which were all declared as good as one another, it is puzzling to think of a photographer selecting CT for any other reason than they already had it to hand.

Although neither Jacobson nor Sussman went into detail about the variety of health threats posed by CT, preferring instead to assume that photographers were responsible and careful when handling any chemical, other users expressed strong opinions on this chemical. An example of photographers' awareness of dangers associated with CT appeared in the pages of *AP*, after an article in 1976 suggested using the chemical to clean negatives and did not mention taking any precautions. In an exchange that was played out through the correspondence pages, two users conversed about their perceptions of dangers associated with CT. In the letters that were published, neither correspondent revealed themselves as an expert. Marcus Rowland wrote from London to warn that it was "an extremely dangerous chemical" which could be absorbed through the skin as well as breathed in. To add to these hazards, Rowland pointed out that if CT vapour were inhaled through a lit cigarette it could form

¹¹² C.I. Jacobson, *Developing: The Negative-Technique* (1942); Kurt I. Jacobson, *Developing: The Negative Technique* 18th edition (London: Focal Press, 1976).

¹¹³ Aaron Sussman, *The Amateur Photographer's Handbook*, sixth revised edition (New York: Crowell, 1962); Aaron Sussman, *The Amateur Photographer's Handbook*, eighth revised edition (New York: Crowell, 1973).

phosgene.¹¹⁴ Paul Peronat from Sunderland dismissed Rowland's caution, claiming that the previously listed dangers were relevant for chloroform but not CT, and adding that photographers only needed to worry if they had glue sniffing children who might damage their kidneys from enthusiastic solvent abuse with CT. Peronat claimed that CT was stable, and that it did not form phosgene, instead grouping it with other apparently benign, domesticated chemicals: nail varnish remover and spot remover.¹¹⁵ Peronat's letter demonstrates ignorance and misunderstanding, because many spot removers were in fact CT, and nail varnish remover was often acetone, which is flammable. Peronat's misguided, and possibly even dangerous, opinions appear to have been firmly held: he was moved to respond to Rowland's letter and to do so in a tone that conveyed contempt for the idea of exercising caution with CT.

Rowland got the last word in this exchange, where in the final letter printed on the subject he conceded that chloroform did share some of the same characteristics, but that neither chemical should be used in poorly ventilated situations or by people who were smoking. In his direction of *AP* readers to the Institute of Science and Technology (IST) publication "The care, handling, and disposal of dangerous chemicals", a document which the average citizen would have no reason to read, it became clear that Rowland was approaching this issue from a position of expertise.¹¹⁶ As a school laboratory technician, he encountered this publication as part of his working life. Not only were the details regarding hazardous chemicals relevant to his paid job, but he was able to identify chemicals he used for his hobby as dangerous, to usefully apply precautions and share his improved understanding through the *AP*.¹¹⁷ Editors at *AP* added a note that the IST publication mentioned by Rowland was available from Her Majesty's Stationery Office. They appeared to accept the government document as reliable evidence, but did not apologise for inadequately informing readers of CT's hazards, nor did they thank Rowland for imparting the information.

¹¹⁴ Marcus Rowland, "Chemical Threat from Cleaning," *AP*, 14 July 1976, 82.

¹¹⁵ Paul Peronat, "Glue Sniffing and Chemicals," *AP*, 28 July 1976, 81.

¹¹⁶ Marcus Rowland, "Dangers of Carbon Tetrachloride," *AP*, 11 August 1976, 83.

¹¹⁷ Personal communication, M. Rowland, email 27 September 2014.

Conclusions

This chapter has shown that photographic chemicals were used in home darkrooms by children and adults, males and females, often acting alone but always responsibly. Motivations for using chemicals were varied, ranging from cost limitation, creative or quality control, to self-empowerment. Obtaining a pristine final print required cleanliness and care. The diligence that accompanied the pursuit of perfection, combined with improved products which were less toxic or allergy inducing, meant that most of the chemicals employed in home darkrooms between the 1930s and the 1980s were used in ways that made them safe. The accidental poisonings and explosions that had plagued the early photographers were now so rare as to be non-existent. The near-absence of accidents was not followed by complacency, although the very cautious approach to photographic chemicals that began to be promoted by American books on safety in the 1980s was ridiculed by British home processors, who nevertheless continued to respectfully and carefully handle their chemicals. Domestic darkroom users had, between the 1930s and 1980s, managed to cultivate a reputation of being competent and thoughtful users.

However thoughtful home processors have been in the darkroom, it has often been hard to disentangle their choices of raw chemicals versus commercial preparations when working from their memoirs or oral history interviews. General references to “chemicals” or “powders” without noting brands, suggests indifference rather than any particularly strong feelings towards chemicals. When Dominic appeared to speak on behalf of the majority of photographers saying “we buy our chemicals in packets”, she referred to branded, prepared products, but neither she nor her interviewer found this topic compelling enough to expand upon. Similarly vague statements were typical of the sources that recorded personal experiences of using photographic chemicals, so perhaps individual brands, so long as they were from trusted photographic specialists, were unimportant to users. However, Butcher provided the insight that once a photographer got used to working with a particular set of chemicals and papers, it was a lot of work to adjust to a new product, which suggested that brands were in fact important.¹¹⁸ The

¹¹⁸ Butcher, “Ilford and Photographic Chemicals” ~ 43:00.

picture of brand loyalty regarding chemical use is further complicated by the variety of products and raw chemicals the Hardmans kept in their private darkroom, where they could be more experimental. Using chemicals, whether unbranded or branded constituents or branded convenient mixtures, allowed home processors to achieve results that they personally preferred, which conferred an identity upon them as a “serious” photographer, rather than a “snapshotter”.

The examples given in this chapter illustrate the diversity of approaches photographers took. These varying approaches were supported by the information services provided by manufacturing companies and were a benefit of buying branded products. The authoritative booklets, pamphlets and responses to individual enquiries added value to branded goods. They conferred trustworthiness and made them appear indispensable to the photographer. The readiness with which companies provided information, invited photographers to access further information, and expected photographers to want to access it, was unique among the examples this thesis has examined. As processes and formulae were improved by the large photographic companies, users were protected from harmful chemicals as well as able to process images more easily. Although certain chemicals used in historical photographic processes or in peripheral activities such as cleaning or toning could be used for self-harm, on the whole home processors have been considered responsible and knowledgeable. Photographers’ access to chemicals was not considered threatening enough to require demonstrative shows of government intervention. In fact, photographic chemicals were primarily mentioned on the Poisons Lists as exceptions to the rules, indicating that they were not usually considered dangerous. Even though flash powder was temporarily placed under suspicion as a material that could be sought out by saboteurs, genuine chemical flash users were believed to be responsible users, if occasionally the victim of unfortunate accidents.

When accidents with chemicals happened to photographers, they were not reported in national newspapers. The absence of concern in both the mainstream and medical press about photographic chemicals also suggests that accidental harm and criminal misuse were not a problem. As to the specialist photographic journals, although they carried news of such accidents as ways of informing their likely users, between the 1930s and 1980s the frequency of this type of article was considerably lower than has

been noted by Jay. Nevertheless, manufacturers of photographic chemicals continually improved the usability of their products in order to match the performance of updated cameras, films and flash technologies. Yet when I visited museum collections, chemical technologies were greatly underrepresented in favour of hardware. Cameras and other equipment are relatively stable and risk-free to store, transport and display, and are immediately recognisable as different from those used by most museum visitors. However, their focus on picture-taking technologies means that the chemical side of the story of modern photography is threatened with oblivion. Although the Kodak collection was established as an attempt at managing the company's legacy, most manufacturers have not systematically kept their own archives of packaging or products, although some passionate ex-employees have. This chapter has shown that processing chemicals have a place in histories of photography and can act as a key to reveal engaging stories of users, rich with sensory detail. Chapter 6 which follows looks in further detail at the users of chemicals rather than the chemicals themselves.

Chapter 6: Users and Misusers

The last three chapters have demonstrated that housewives, gardeners and home processors chose to use a wide variety of chemicals in their homes and gardens, including both innocuous and potentially toxic substances. The studied chemicals were generally used appropriately, although some of them could also be misused. The circumstances in which domestically used chemicals killed and maimed were not unique, but were replicated time and again in homes across Britain. Users, rather than the inherent toxicity of the chemicals, were central. What was dangerous was users' heedlessness, mistakes, passion, jealousy and despair.¹

In this chapter I look more closely at the different categories of users and misusers, to establish who ultimately shaped the chemicals available in the home. Between the 1930s and the 1980s, more information about chemicals and branded products was demanded on behalf of users, and came to be expected by them. However, even when this demand was met, users continued to misuse them or have accidents. The improvement of domestic chemical safety was continually thwarted by users who either ignored or did not comprehend the information provided to them, or otherwise behaved in ways that resulted in harm. I therefore begin by considering those whom Ernest Neathercoat categorised in 1926 as ignorant, careless and despairing users, as well as inquisitive children.² These groups remained clearly identifiable throughout the period studied, so by their longevity and influence should be viewed as important. The categories overlap at times, for instance, inquisitive children could also be ignorant misusers because they were unaware of what a chemical was and its potential danger, but Neathercoat's four categories are a useful starting point from which to consider how misusers would eventually influence what chemicals were available for home use.

¹ Alexander Wynter Blyth and Meredith Wynter Blyth, *Poisons: Their Effects and Detection*, fifth edition (London: C. Griffin & Company, 1920), 104-108, 179-180.

² E.T. Neathercoat, "Poisons in the Home," *DM*, 02 January 1926, 6.

Ignorant users

Neathercoat did not fully explain what he meant by ignorant, but I have interpreted it as the user lacking knowledge about the substance or product. A deficit of knowledge can be remedied by providing information to users and therefore, ignorant misusers appeared to be the easiest category for regulators and manufacturers to address. As Table 1.1 showed in Chapter 1, rules and laws prioritised the importance of informing users about the chemicals and products they chose. Even if there were doubts about what users would really understand from seeing chemical names, the principle was upheld that users should be informed about what was in the products they bought.³ To reiterate a point made in Chapter 1, the delivery of information for users was not couched in terms of the “right-to-know”. Instead, the argument made on behalf of consumers for better information emphasised that individuals should be able to make personal choices.

Much of the information provided to users was through labelling. The success of labelling depended on eyesight, literacy and comprehension, as well as the product being kept in its original container. The distinctively shaped and textured glass bottles that had allowed a poison container to be distinguished by touch were lost when plastic packaging began to dominate in the 1960s, and this change was mourned.⁴ Users were told that they should appreciate plastic containers because they were lighter and could not smash as glass bottles might,⁵ but this safety improvement was in fact an exchange. Although the worry of a shattered bottle was lessened, users no longer received the tactile reassurance from a smooth, curvy container that signalled harmlessness, or conversely, the alert provided by the edges and ridges of a poison bottle.

The provision of information to combat ignorance has by no means been straightforward or uncontested. Whenever the case has been made to warn users that a chemical or branded product was a poison or to indicate that it could

³ Joyce Butler, “Farm and Garden Chemicals,” HC Deb *Hansard* (20 July 1971): vol 821 cc1295-407.

⁴ John Forrester et al., “Dangerous Household Products (Child Safety) Packaging Bill,” HC Deb *Hansard* (29 January 1982): vol 16 cc1157-67.

⁵ J. G. Avery and R. H. Jackson, *Children and Their Accidents* (London: Edward Arnold, 1993), 57.

potentially harm them, there has been an argument against it. Imperial Chemical Industries (ICI) for example did not want to alarm or put people off using paraquat.⁶ Promoting the fact that a product did not contain feared poisons was also a regularly used tactic, such as weedkiller that did not contain arsenic, then later, weedkiller from which paraquat was absent.⁷ The drawback to providing information in order for a product to be used safely, is that despairing users can interpret any warnings to use the product harmfully.⁸ Similarly, the information that products contain volatile solvents and that solvent abuse is dangerous has been argued to draw attention to unwanted behaviour and cause children to experiment when they had previously been unaware of the practice.⁹

Manufacturers expected some users to disregard warnings, an issue that those in the chemical industry grappled with for every new product. As Eric Edson, research director of chemical company Fisons, explained on television in 1964, misuse was viewed as an “inevitable risk” for any new chemical product, including household and garden chemicals.¹⁰ He made it clear that chemists were exceedingly careful to produce useful, effective products that could be used safely. Edson directed attention to the user as a cause of problems when he said “I bet my bottom dollar that someone is going to misuse it so much that even the safest chemical is going to cause trouble somewhere, sometime.”¹¹

Careless users

The next category of Neathercoat’s users, careless users, appeared in all three case-study chapters, although home processors seemed to be especially vigilant when working with chemicals, in order to produce excellent images. Domestic chemical users were careless when they did not heed the information that was

⁶ Swan, A. A. B., “Letter to F. Stewart 13 May 1968,” HO305/32, TNA.

⁷ “Deeweed,” *DM*, 08 August 1981, 5.

⁸ “The Poisonous Substances Bill,” *The Lancet* (09 July 1898): 93-94.

⁹ “Summary of Information from Drug Liaison Committees on Solvent Sniffing,” JF 1/6, TNA.

¹⁰ “Pesticides and Posterity,” *Horizon*, BBC Television, first aired 30 May 1964 (accessed British Film Institute).

¹¹ *Ibid.*

provided to them by a tactile poison bottle, a printed warning label or instructions for use. Additionally, they were careless if they tried to use chemicals in inadequate light, or while they were intoxicated. Carelessness included the inappropriate storage of chemicals or products, such as where children could reach them, or in an unlabelled container. Healthcare professionals emphasised that “the majority of poisoned children had sensible mothers who showed neither serious lack of thought nor feckless irresponsibility”.¹² Nevertheless, when they examined data about childhood poisonings in order to rate the appropriateness of poisons containers (such as having an intact label, or being in the original container) and their locations, more often than not they were both deemed unsuitable.¹³ The fact that these researchers only commented on the mother, not the father, nor any other members of the household, demonstrates the importance placed on women for safeguarding the home and the children within it. The researchers emphasised how only a short lapse in attention or judgement could be at the root of an accident, rather than a wholly chaotic lifestyle.

Children were particularly susceptible to accidents as a result of adults’ carelessness or lack of thought when chemicals were decanted from their original container, but even adults mistook chemicals stored in bottles for harmless drinks. This type of accident was a recurrent theme. It was seen with clear, colourless CT stored in a gin bottle, or brought home in a juice bottle,¹⁴ but most often with paraquat.¹⁵ In the latter case, the dark brown liquid resembled cola and was readily swigged by children and adults alike. Ordinarily responsible people did strange things, such as the prison officer who forgot that he stored paraquat in an aftershave bottle then attempted to determine what the substance was by tasting

¹² R.H. Jackson et al., “Circumstances of Accidental Poisoning in Childhood,” *BMJ* 4 (26 October 1968): 245-248.

¹³ *Ibid.*

¹⁴ A.W.H. Foxell, “Three Cases of Carbon Tetrachloride Poisoning with One Fatality,” *BMJ* 1 (1951): 397.

¹⁵ For example - “The Boy Who Can’t Be Saved,” *DM*, 15 February 1971, 3; Jane Gaskell, “The Boy Who Thought He’d Had a Drink of Pop,” *DM*, 24 June 1971, 6; “Poison Warning Call,” *DM*, 10 October 1972, 11.

it.¹⁶ ICI's internal memos about accidental poisoning with Gramoxone emphasised human factors beyond the company's control. For example, accidents happened when users drank alcohol, as well as when they disobeyed the explicit instruction not to decant the chemical, and then stored the weedkiller among other drinks.¹⁷ These behaviours truly were out of the company's hands, but the importance of packaging design should not be overlooked.

Packaging appeared to be central to preventing certain types of misuse. The dry cleaning fluid bottles that integrated application pads into their design (Chapter 3, Figure 3.7) solved two of the problems associated with standard bottles. The applicator pad limited the amount that spilled if the bottle was knocked over, and it avoided the need to use a cloth. These designs added value not only with respect to the intended use, but also by clearly differentiating them from medicine or beverage bottles. Functional packaging could therefore mitigate carelessness, although ideally, users would be careful, sober, literate and not mentally or physically challenged adults.

Careful users relied on common-sense measures to avoid accidents: they stored clearly labelled containers securely, away from children, and recognised that children could be determined enough to access apparently difficult places, such as climb six feet up a dresser to reach a bottle of soldering fluid (containing hydrochloric acid).¹⁸ Responsibility for careful use ultimately rested with the user, a fact that was consistently expressed throughout the 1930s to the 1980s by advocates for better information, such as MP Joyce Butler and organisations like RoSPA and the Consumers' Association, who argued that users should be provided with appropriate, clear instructions and warnings so that they had the best chances of behaving responsibly.

In addition to the information that manufacturers provided on product packaging, RoSPA published educational material to draw attention to accidents involving chemicals at home, but the organisation's efforts were rarely cited in

¹⁶ "The Killer Inside the Bottle," *DM*, 08 July 1972, 20.

¹⁷ "Paraquat and Diquat Liquid Formulations: Summary of Experience of Human Exposure December 1965 - May 1967," MAF 284/307, TNA.

¹⁸ T. McKendrick, "Poisoning Accidents in Childhood," *Archives of Disease in Childhood* 35 (1960): 131.

newspapers, magazines or advice literature. The *Daily Mail* consistently ran articles that highlighted home accidents and never mentioned RoSPA.¹⁹ Instead, the paper promoted its own investigations and initiatives. On the occasion that RoSPA was mentioned, it was not especially positively. For instance, Carper and Gundry credited RoSPA, The Pharmaceutical Society and the British Red Cross as their sources of details of accidents and preventive measures, whilst alleging that there was silence about accidents in the home, the existing advice was unrealistic, and potentially lifesaving information was not easy to access.²⁰ These evaluations suggest that limited budgets hindered wider dissemination of accident prevention,²¹ or perhaps that the bodies who produced it needed to work more closely.²²

Medical professionals criticised ineffective educational and behavioural interventions to reduce accidental poisoning. For example, in 1974, Michael Calnan from the Health Education Council (HEC) drew attention to an education campaign had been running that year, which advised householders to clear out unneeded medication. Calnan had found that household substances (paraffin, turpentine, bleach and weedkiller) accounted for just over half the poisonings in his report, despite the fact that medications were usually deemed the biggest culprits. Additionally, 81 per cent of all the substances involved had been used for the intended purpose within a day of the accident, indicating that the focus of the campaign, on old medication, did not relate to most of the cases.²³ He therefore argued that users could still benefit from education about the careful use and disposal of household chemicals.

The interest that the HEC had in preventing domestic accidents suggests that the Council hoped that many chemical users could be provided with education. Such

¹⁹ "Aspirins Are the Biggest Killer of Under 5's" *DM*, 24 April 1966, 5; "These Could Kill You," *DM*, 24 June 1971, 6.

²⁰ Elizabeth Gundry and Jean Carper, *Stay Alive: How to Avoid Accidents in the Home* (London: MacGibbon & Kee, 1967), inner dust jacket, 12.

²¹ James Dempsey, "Home Safety," *HC Deb Hansard* (19 November 1964): vol 702 cc598-9.

²² Jackson, R.H. and A.W. Wilkinson, "Why Don't We Prevent Childhood Accidents?" *BMJ* 1 (1976): 1258-1262.

²³ M. Calnan, "Accidental Child Poisoning and Health Education," *British Journal of Preventive & Social Medicine* 28 (1974): 67.

a venture would further legitimise the HEC's role, but also supported the view that accident proneness was generally not a special concern, evidenced by the lack of discussion on this type of user. Instead, accidents continued to be portrayed as misfortunes that could happen to anybody, and there were plenty of reasonable measures that all users could take to avoid accidents. A different view was held by a family general practitioner and author of a series of self-help books, Kenneth Hutchin, who believed in accident proneness, but also that it could be overcome through "intensive training". Accident proneness and poisoning were topics dealt with only in Hutchin's book on children, not in his books on adult health, indicating that he believed that accident proneness could be outgrown.²⁴ This disparity is typical of the concern expressed for protecting children, while ignoring the fact that adults also had the same types of accidents.²⁵

Inquisitive children

Children as chemical users are a special case in this thesis. The status of children as precious and priceless was well established in the 1930s.²⁶ Chemicals in the hands of children were seen as a particular problem because their childish ignorance made them especially vulnerable to accidents.²⁷ It was important for children to learn about the causes and types of accidents that could happen with chemicals in order for them to anticipate and prevent them. Adults were expected to be responsible for children and to educate them about chemical safety, rather than simply keep children and chemicals apart without explanation. Parents agreed that they were the ones, rather than outside educational agencies, to teach young

²⁴ Kenneth Hutchin, *How Not to Kill Your Children* (London: George Allen & Unwin, 1968), 131; *How Not to Kill Your Husband* (London: George Allen & Unwin, 1962); *How Not to Kill Your Wife* (London: George Allen & Unwin, 1965).

²⁵ "Confused Bottles," *Derby Daily Telegraph*, 14 September 1938, 7; "The Killer inside the Bottle."

²⁶ Viviana A. Zelizer, *Pricing the Priceless Child: The Changing Social Value of Children* (New York: Basic Books, 1985); James Ede, "Education (School Attendance) Bill," HC Deb *Hansard* (06 November 1930): vol 244 cc1089-207 "the most precious thing given to earth is a new child"; Nancy Astor, "Evacuation," HC Deb *Hansard* (14 September 1939): vol 351 cc802-86. "Whatever we do we must save the children because they are our most precious asset."

²⁷ Gundrey and Carper, *Stay Alive*, inner dust jacket, 103, 111-112.

children how to be safe at home.²⁸ Carper and Gundrey urged parents to explain accidents to children and to point out when the child was at fault if an accident occurred, instead of rewarding children for accidents. These safety-minded authors insisted that parents should supervise their children's activities.²⁹ Their focus on explaining why something had happened was important because they acknowledged the complexity of circumstances that led to accidents. Carper and Gundrey sought to share the responsibility for safety among adult users, and the children under their supervision, as well as manufacturers, retailers and regulators.

Gill Combes ran discussion sessions in the late 1980s with Scottish children, and looked at the drawings they produced to find out what they thought could cause accidents at home. The children in Combes' workshops certainly knew about dangers from chemicals, because they offered specific advice on how to avoid them, for example "My mum says never go under the sink 'coz [that's where] she puts all the things that can hurt you if you drink them". The children suggested that accidents happened if you tried to be helpful around the house, if you did something you were not allowed to do, or ignored what adults told you, all of which related to how chemicals should be kept away from, and not used by, children.³⁰ However, chemicals did not feature in the children's drawings of accidents. This absence can be explained by the fact that children were more familiar with the falls, heat sources and animal bites which they illustrated, or that injuries from chemicals were hard for children to draw because they were difficult to visualise.

The insistence that household chemicals should be kept away from children reinforced the notion that chemicals were dangerous. Although weedkillers were occasionally promoted as simple to use by including the image of a child in advertisements (Figure 6.1), children were not usually expected to be involved in the application of pesticides or cleaning beyond washing up or tidying. However, children were sent to buy chemicals in domestic containers from the oilshop, for

²⁸ Gill Combes, *You Can't Watch Them Twenty-Four Hours a Day: Parents' and Children's Perceptions, Understanding and Experiences of Accidents and Accident Prevention* ed. Child Accident Prevention Trust (London: CAPT, 1991), 13, 17, 21.

²⁹ Gundrey and Carper, *Stay Alive*, inner dust jacket, 103, 111-112.

³⁰ Combes, *You Can't Watch Them*, 13, 17 and 21.

example, paraffin,³¹ and sometimes they deliberately used chemicals. For example, the six-year-old boy who cleaned his model railway tracks with CT,³² or the teenaged fish breeder who vengefully decimated two tanks of Japanese fighting fish by adding caustic soda and copper sulphate “to be sure” that the fish were killed.³³ Patience and dexterity were necessary for the successful use of chemicals, and although home processing was presented as a suitable activity for children, very young children were not encouraged to take it up. Disappointing results from clumsy handling or impatience were anticipated to put young children off home processing, rather than the toxicity of chemicals being a notable problem.



Figure 6.1: Extracted from Boots Lornox brochure, 1948. The illustration did not mean that children were intended to use the herbicide, only that the product was simple enough to be used by a child. ©The Walgreens Boots Alliance Archive.

Photographer Paul Carter learned how to process photographs with his father, an experience he valued and looked back on fondly.³⁴ With optimism, he looked forward to one day sharing similar darkroom experiences with future grandchildren.³⁵ Carter’s memories of using chemicals were just one part of the whole darkroom experience. What he wanted to share was the magic of the developing images and becoming absorbed in the multisensory practice. Such positive sentiments were not shared by other user groups, even though to some extent chemical use was learned through observing and helping family members –

³¹ D.M. Bailey, *Children of Bethnal Green* (Stroud: History Press, 2013); G. O’Neill, *My East End: Memories of Life in Cockney London* (London: Penguin, 2000).

³² “Smell Kills Boy Aged 6,” *DM*, 20 October 1962, 6.

³³ “Put Caustic Soda in Fish Tanks,” *The Manchester Guardian*, 27 November 1953, 4.

³⁴ Paul Carter, “Oral History of British Photography,” interview by Shirley Read (2006).

³⁵ Paul Carter, “Using Photographic Chemicals,” interview by Cat Rushmore (31 July 2015).

for instance to do laundry³⁶ – but children were not encouraged to handle potentially poisonous herbicides or stain removers.

Rather than being injured while using chemicals for their intended uses, “misapplied leisure” was the explanation behind some children’s chemical accidents. The discovery of seasonal and daily variations in childhood accidental poisoning, which was explained by insufficient or lapsed supervision on Fridays, Saturdays and during school holidays, once again highlighted the role of parental attentiveness in protecting children from the dangers of chemical misuse. In their review of hospitalised accidental poisoning, Graham and Hitchens noted that although boys were more likely than girls to be involved in poisoning incidents between 1950-1962, this difference subsequently disappeared. Additionally, the weekend effect became less pronounced, which they attributed to an increasingly “passive” childhood.³⁷ Although they did not state what form this passivity took, radios and televisions were becoming embedded in British homes during this period. In 1974, Calnan was able to report that boys were still not showing up as statistically more likely to be poisoned, but wondered if this was because girls were more likely to be taken to hospital by anxious parents.³⁸

Apart from poisoning, burns were also a problem because boys appeared to have a special interest in pyrotechnics. British children had the annual excitement of Bonfire Night, not to mention year-round mischief. Between 1956 and 1966, 242 young people had been injured by homemade explosives containing sodium chlorate.³⁹ Inspiration from or imitation of newsworthy events were rarely cited as stimuli in the reports of adolescent sodium chlorate banger and bomb makers of the 1950s onwards. However, the terminology of “rockets”⁴⁰ outside of firework season hints at war games and the space race.

³⁶ “A16 Clothes Washing – Motives and Methods” Mass Observation, 1939, 24.

³⁷ J.D.P. Graham and R.A.N. Hitchens, “Trends in Hospitalized Accidental Poisoning,” *British Journal of Preventive & Social Medicine* 22 (1968): 55-58.

³⁸ Calnan, “Accidental Child Poisoning and Health Education.”

³⁹ “Home made explosives (accidents)” HC Deb *Hansard* (28 June 1966): vol 730 cc250-1W.

⁴⁰ Gundrey and Carper, *Stay Alive*, 101-102.

Explosions, therefore, were not always completely accidental; they were sometimes premature or larger than anticipated. Reports of injuries from homemade explosives invariably related to boys.⁴¹ The *Daily Mail* interviewed a couple of schoolboy makers of homemade explosives, who admitted that they had needed protection from themselves, and supported the idea that shopkeepers should not sell certain chemicals to teenaged customers.⁴² After the craze for homemade bangers and bombs, the next chemical danger to children that the government and the press became involved in was that of volatile substance abuse (VSA), also known as glue or solvent sniffing. Solvent sniffing has a place in this thesis because it often took place at home.⁴³

Seeking “highs” from volatile chemicals in a wide range of household substances had been prevalent among teenagers since the 1950s, but the practice only sporadically came to public attention when a fatality occurred or a violent incident was carried out while under the influence of such a substance.⁴⁴ Taylor *et al.* gathered statistics on solvent sniffing practices, including the variety of substances that were abused (Table 6.1) and the age distribution of fatalities: 1109 out of 1596 (69.5 per cent) were under 20 years old, 84.5 per cent were under 25. As a direct result of an attempt in 1986 to reduce VSA, by preventing sales of solvents to children aged under 18, Esmail *et al.* reported that restriction of supply, and publicity surrounding VSA shifted sniffers from domestic solvents towards riskier but widely available gas products.⁴⁵

⁴¹ “Boys Get Killer Bomb Warning,” *DM*, 07 April 1960, 1; “Weed-Killer Bomb Kills Boy,” *DM*, 15 April 1961, 1; “Fight for Sugar-Bomb Boy’s Life,” *DM*, 19 March 1962, 6; “Bomb-Making Outbreak,” *TT* 19 March 1962, 5; R.E. Parker, “Warning Needed,” *TT* (19 August 1964) 11; These are only a few of the explosions involving sodium chlorate.

⁴² “Victims Tell of Struggle to Find a Career,” *DM*, 21 August 1964, 5.

⁴³ J.C. Taylor *et al.*, “Trends in Deaths Associated with Abuse of Volatile Substances,” 48, 1998. <http://www.dldocs.stir.ac.uk/documents/vsa7196.pdf> (accessed 16 June 2016).

⁴⁴ Joyce M. Watson, “Clinical and Laboratory Investigations in 132 Cases of Solvent Abuse,” *Medicine, Science and the Law* 18, no. 1 (1978): 40-43; Alastair McQueen, “Terror of the Teeny Glue Gangs,” *The Daily Mirror*, 24 October 1979, 16-17.

⁴⁵ A. Esmail *et al.*, “Controlling Deaths from Volatile Substance Abuse in Under 18s: The Effects of Legislation,” *BMJ* 305 (1992): 692.

Table 6.1 Table of products abused by substance 1971-1996, adapted from Taylor et al., 1998.⁴⁶

	Linked to number of deaths	% of all substances
Total Gas Fuels	664	39.3
Total Aerosols	322	19.1
Personal care	218	13.7
Air freshener	37	2.2
Unspecified	34	2.0
Cleaning fluids	15	0.9
Paint, glue	11	0.7
Insect spray	7	0.4
Total Other	329	19.5
Chloroform	23	1.4
Anaesthetic agents	20	1.2
Dry cleaning fluids	20	1.2
Domestic cleaning fluids	17	1.0
Industrial solvents degreasers	13	0.8
Carbon tetrachloride	11	0.2
Ether	3	0.2
Benzene	1	0.1
Other and misc.	221	13.1
Fire extinguishers	56	3.3
Glues	303	17.9
Unknown	15	0.9
Total Deaths from all substances	1689	

Table 6.1: Some substances were co-abused, deaths are as percentage of substances, not percentage of deaths.

Table 6.1 includes CT, discussed in Chapter 3 as a stain remover and in Chapter 5 for fixing scratched negatives. A total of 11 solvent sniffers between 1971 and 1986 died using CT, indicating that it was one of the least commonly abused substances on the list. Although the researchers did not give an explanation for the relatively low prominence of CT, it is likely that it is related to the gradual withdrawal of CT from consumer products. The smell and the effect of CT were not unpleasant and the chemical was associated with accidental child deaths from the 1940s. Rags that were used to apply the chemical were taken to bed by children,

⁴⁶ J.C. Taylor et al., "Trends in Deaths", Table 8, 42. Personal care: deodorant, pain relief, hairspray.

who were killed by the solvent fumes.⁴⁷ Although labels on CT-based cleaners informed users that they should work in a well-ventilated space, the warnings did not specify the consequences of failing to use CT according to these directions, which meant that the gravity of the danger was not always obvious. The absence of clear consequences in warnings was a persistent issue with the more toxic chemicals studied, and was associated with a desire to not alarm or deter users.

Deliberate solvent sniffing had caused deaths long before, but the behaviour only became referred to as “solvent abuse” in the 1970s and 1980s when it was linked to other worrying or antisocial teenage behaviour. Hutchin was ahead of his time in 1968 when he warned parents to be alert to the possibility that their children could be solvent sniffing, and listed some household chemicals as the culprits.⁴⁸ Similarly, Leslie Keating, who authored a book of hints for the housewife, wrote candidly in 1972 about the potential for domestic solvent abuse. She strongly advised readers to discourage their children from such behaviour, and her advice included keeping domestic cleaning solvents out of reach.⁴⁹

Although stories about solvent abuse only began to appear in the press in 1978, the Department of Prices and Consumer Protection (DPCP), with the support of the Home Office, had been investigating the types of products involved since 1972, as well as reviewing local education and prevention strategies. The Department’s archives reveal a trigger for these activities, in the form of a letter written in 1971 by a Mrs Chasle, a mother driven to a nervous breakdown by her son’s violent and destructive behaviour after solvent sniffing.⁵⁰ This behaviour had resulted in him serving three custodial sentences in borstal, and she wrote asking for help. Her letter referred to her son’s product of choice, Lady Esquire shoe cleaner, and she had already pleaded with the manufacturers to stop production, to no avail. Lady Esquire’s place in youth culture and solvent sniffing was made evident when

⁴⁷ “‘Chloroform’ Cleaner Kills Girl of Six,” *DM*, 02 July 1947, 3; E. Love and A. Miller, “Fatal Poisoning by Inhalation of Carbon Tetrachloride (Thawpiti),” *The Lancet* 257 (1951): 1306-1307; “Deadly Duster Kills a Girl,” *The Daily Express*, 15 May 1958, 7; “Smell Kills Boy Aged 6,” C.J. Polson, “The Role of the Pathologist in the Investigation of Fatal Poisoning,” *Medicine, Science and the Law* 5 (1965): 203-210.

⁴⁸ Hutchin, *How Not to Kill Your Children*, 252.

⁴⁹ Leslie Keating, *Stain Removal* (Havant: Kenneth Mason, 1972), 7.

⁵⁰ M.A. Chasle, “26 May 1971, Letter to Miss Henderson,” JF 1/6, TNA.

she described how it was available from a music shop, in addition to the more legitimate retailers namely shoe shops and chemists.⁵¹

Lady Esquire was not the only branded product misused in this way. In Portsmouth, children and adolescents had been known to use Thawpit for sniffing well before 1970. In 1972, the craze for sniffing had temporarily died out, until it started again in the new school year, this time with Lady Esquire.⁵² Leeds Drug Liaison service were aware of solvent sniffing, including Thawpit,⁵³ and an epidemic in Teesside was brought under control by a youth club leader working with local retailers to prevent sales to likely solvent abusers.⁵⁴ Elsewhere in the country, however, the activity appeared more isolated, and in Oxfordshire solvent abuse was not considered much of a problem, being limited to “the foolish type of boy, who will do anything for a dare”.⁵⁵ Echoing the concerns associated with the labelling of poisons, some of the police forces, youth services, and drugs liaison teams which contributed to the DPCP’s investigation considered that drawing attention to the possibility of “highness in the head” through product labelling or other educational measures would only encourage more young people to experiment.⁵⁶ The use of solvents for physical sensation was not restricted to curious children and boundary-pushing teenagers.⁵⁷

⁵¹ *Ibid.*

⁵² John F. East, “Drugs Misuse Services: Report on “Sniffing” (the Inhalation of Chemical Substances for Pleasure) in the Portsmouth Area,” JF 1/6, TNA.

⁵³ Diana Ball, “08 March 1973, Letter from Leeds Drug Liaison Committee to A.C. Burden,” JF 1/6, TNA.

⁵⁴ J. Blackburn, “17 January 1973, St Luke’s Hospital, Letter to J.H. Howard,” JF 1/6, TNA.

⁵⁵ “Summary of Information from Drug Liaison Committees on Solvent Sniffing,” in JF 1/6, TNA; M.J. Pleydell, “20 February 1973, Letter from Oxfordshire County Council Health Dept to J.H. Howard,” in JF 1/6, TNA.

⁵⁶ “Summary of Information from Drug Liaison Committees on Solvent Sniffing,” JF 1/6, TNA.

⁵⁷ George Fallows, “I Let the Gas Man Dope Me,” *Daily Mirror*, 18 November 1960, 6; J. Payne, “The Criminal Use of Carbon Tetrachloride,” in *History of Anaesthesia Society Autumn Scientific Meeting*, 2003, 12-13; A.R. Allan et al., “A Chloroform Inhalation Fatality – an Unusual Asphyxiation,” *Medicine, Science and the Law* 28 (1988): 120-122.

Despairing users

More prevalent than VSA were the deliberate misuse of chemicals ordinarily used for activities around the home by despairing and distressed users and those who were either cruel or wicked enough to use chemicals to kill or maim others. It could be hard, however, to tell accidental and deliberate poisoning apart. The coroner's summary of an inquest in 1938 exemplified the two ways in which a chemically-related death could be interpreted. One explanation for the death of an elderly, almost blind woman following the ingestion of a corrosive liquid disinfectant was accidental death: she was unable to see the difference between the poison and her medicine bottle. The other interpretation emphasised her status as a widow, her ill health and her worries, as well as the fact that her medicine and the cleaning fluid were usually kept far apart, suggesting that ingestion of the poison could have been deliberate.⁵⁸ This inquest, and others like it, revealed timeless human concerns: poor health, money worries, unhappy relationships or loneliness, but also showed that opportunities existed to prevent accidents. The gradual replacement of liquid corrosives with alternatives, and the development of easily distinguishable packaging, contributed to the very low levels of fatalities associated with domestically used chemicals between the 1930s and the 1980s.

Accident prevention and suicide prevention have been closely entwined. It had been argued that packaging and labelling could alert a despairing user to a chemical's potential for harm, but packaging that could prevent accidental poisoning could also slow down or deter impulsive misusers. Sealing a cork stopper with wax,⁵⁹ or putting pins through the cork⁶⁰ were things that users could do at home to avoid accidents, but these measures could also hinder despairing users drinking chemicals in a passion. Although women who committed suicide using domestic chemicals were often portrayed as hysterical and prone to rash actions, for instance after a

⁵⁸ Lambert, COR/3/2/1938/54, *The Keep*, 1938.

⁵⁹ "For Poison Bottles," *Hastings and St Leonards Observer*, 22 March 1924, 4.

⁶⁰ "The Wrong Bottle," *Yorkshire Evening Post*, 06 September 1933, 6.

“tiff”,⁶¹ men also behaved impetuously.⁶² A story about a young soldier who died after being assaulted revealed that his liver had been seriously damaged not by the fight, but by impulsively drinking CT years before as a suicidal teenager.⁶³ However, not all suicides were unplanned: some despairing users made elaborate preparations, such as the man who constructed a polythene tent in his home in order to fill it with noxious CT fumes.⁶⁴

The very presence of potentially poisonous chemicals in the home was highlighted as a suicide risk factor by psychiatrist Neil Kessel.⁶⁵ He advocated disposing of unnecessary or out-of-date medicines and argued that this simple action would be the “single greatest public health measure to reduce self-poisoning”. Although Kessel was concerned with deliberate self-poisoning, this advice was eventually promoted as an accident prevention initiative, yet never extended to include domestically used chemicals despite the reality and regularity of herbicide poisoning. Discarding chemicals represented a waste of money and, if the chemical or product had not degraded, a waste of materials.

The expense of small packets of Weedol was blamed for some gardeners seeking Gramoxone, the variant of paraquat for agricultural use. Paraquat became notorious for suicide,⁶⁶ and in the hands of a despairing but determined user, even Weedol, which was specifically formulated to be safer than the agricultural concentrate, could be eaten in quantities large enough to be fatal.⁶⁷ In such cases, it is especially sad to imagine the person perhaps feeling as if they are in the wrong place and unwanted, like a weed. Herbicides that also killed people were continually promoted as safe and non-poisonous, and there was no disquiet about the fact that sodium chlorate, when ingested, was poisonous, rather than harmless as the

⁶¹ “Paraquat: Firm Urged to Act,” *DM*, 31 October 1972, 11.

⁶² Ian Smith, “Son Takes Poison to Punish Father,” *DM*, 08 June 1977, 11.

⁶³ “Boy Soldier Was ‘Doomed to Die’,” *The Manchester Guardian*, 09 November 1954, 4.

⁶⁴ “Tent of Death,” *Guardian*, 21 January 1984, 2.

⁶⁵ Neil Kessel, “Self-Poisoning: Part I,” *BMJ* 2 (27 November 1965): 1268; Neil Kessel, “Self-Poisoning: Part II,” *BMJ* 2 (04 December 1965): 1339.

⁶⁶ “Taxman Who Lived in Fear of the Taxman,” *DM*, 14 February 1979, 20; “Rape Torment of Poisoned Girl,” *DM*, 05 May 1979, 9.

⁶⁷ R.D. Teare, “Poisoning by Paraquat,” *Medicine, Science and the Law* 16 (1976): 9-12.

literature suggested. Even though applying herbicide was a seasonal activity, deaths from the deliberate ingestion of weedkillers did not necessarily follow this pattern because herbicides were often stored until needed.

Domestic chemicals could be used in ways that were cruel, that caused misery, harm or death. Writing racist messages on greens with caustic soda,⁶⁸ and killing flowers with CT were both malicious acts.⁶⁹ Other examples of cruelty include the throwing of corrosive fluids. When arguments took place at home, domestically used corrosive chemicals were often to hand. In one attack, after John Lloyd's wife complained he didn't give her enough money, Lloyd accused her of spending it all on cigarettes and threw caustic soda at her.⁷⁰ In another, Marcus Mahoney went to Carol Pike's house and threw caustic soda at her after she declined to take their friendship further.⁷¹ These attacks differed from characteristic nineteenth-century acid attacks because they took place at home, rather than in public, and were carried out with readily available corrosives, not strong mineral acids that were subject to Poisons Rules.⁷²

Murder was the ultimate misuse of domestic chemicals. The press seized on murder stories because they combined turbulent, unconventional, adulterous relationships with a nightmarish death, which made for salacious, gripping news. Paraquat changed from a chemical involved in tragic accidents, to one used in suicides, and then, in 1974, to murder. Echoing Clair Scrine's study of Thallrat,⁷³ poisoners claimed to have been inspired to use the weedkiller by reading about its fatal effects.⁷⁴ Despite paraquat's reputation as a killer chemical, the poisoners

⁶⁸ "‘Jews Keep out’ Sign on Links," *Daily Express*, 11 July 1938, 1.

⁶⁹ "Prize Flowers Poisoned," *DM*, 03 November 1947, 3.

⁷⁰ "Woman Burned by Acid," *The Manchester Guardian*, 14 January 1949, 8.

⁷¹ "Weeping Man Hides from Scarred Girl," *Daily Express*, 06 December 1962, 14.

⁷² Katherine Watson, "Loss of Face – Vitriol Throwing in 19th and 20th Century Britain," Oxford Brookes seminar, 27 March 2013.

⁷³ Clair Scrine, "'More Deadly Than the Male' the Sexual Politics of Female Poisoning: Trials of the Thallium Women," *Limina* 8 (2002): 127-143.

⁷⁴ "Love Bites Made Me a Poisoner," *Daily Mirror*, 03 July 1974, 3. "‘I’ll Pole-Axe You’ a Mother’s Shout at Murder Case," *DM*, 05 July 1974, 13; "Poison stew wife is jailed for life," *DM*, 10 January 1975, 11.

unconvincingly claimed that they were just using it as a “frightener”,⁷⁵ or to “lay him up”, to give them time to change or escape an unhappy marriage.⁷⁶ Poisoning has often been thought of as a method used predominantly by women because it did not require physical strength, but research for this thesis supports the view that poisons in general were used about equally by men.⁷⁷

However sensational, murder using household chemicals was rare, and when surreptitious poisoning threatened to be a problem, as it did with paraquat, a strong and disgusting smell was added by the manufacturer to make the chemical more noticeable. Nevertheless, there were other forms of deliberate, but not always fatal poisonings caused by the administration of domestically used chemicals. In 1976, paediatricians from Great Ormond Street Hospital teamed with doctors from London’s poison unit at Guy’s Hospital to publish a paper which described non-accidental poisoning as part of “battered child syndrome”, and responses to the publication suggested that such poisoning was more widespread than previously reported.⁷⁸ Nevertheless, detecting this misuse of chemicals was difficult. Unlike the growing use of X-rays, which could reveal and record broken bones as evidence of abuse,⁷⁹ there was no regularly used chemical test, despite the increasingly sophisticated analytical equipment available in hospitals.

Although most cases of non-accidental poisonings involved drugs and medicines, household substances including pesticides and horticultural agents were used too. Sodium chloride, common salt, stands out among these, because

⁷⁵ Keith Colling, “Wife ‘Gave Husband Poison to Teach Him a Lesson’,” *DM*, 20 March 1974, 1.

⁷⁶ “Runaway Plan of Poison Pie Wife,” *DM*, 05 November 1982, 15.

⁷⁷ Katherine Watson, *Poisoned Lives: English Poisoners and Their Victims* (London: Hambledon and London, 2004).

⁷⁸ David Rogers et al., “Non-Accidental Poisoning: An Extended Syndrome of Child Abuse,” *BMJ* 1 (03 April 1976): 793-96; Douglas Pickering et al., “Non-Accidental Poisoning and Child Abuse,” *BMJ* 1 (1976): 1210-11.

⁷⁹ Jennifer Crane, “‘The Bones Tell a Story the Child Is Too Young or Too Frightened to Tell’: The Battered Child Syndrome in Post-War Britain and America,” *Social History of Medicine* 38 (2015): 767-788.

paediatrician Roy Meadow took a special interest in the chemical,⁸⁰ and he went so far as to list salt as the most common chemical used to harm children.⁸¹

It is interesting that, in these instances of child harm, apparently benign household chemicals such as common salt and bicarbonate of soda were taking the place of previously ordinary but poisonous household substances – arsenic, strychnine, mineral acids and opium. The fact that Pickering and colleagues made a plea for poisoning to be considered “just as serious as the more emotive physical battering” was puzzling, as if poisoning had never been an emotional issue,⁸² when, in fact, it was not a new development, but was underreported in the medical literature. Even Williams and Griffin’s article, which dealt with the long history of child abuse, did not include chemicals.⁸³ These researchers missed an opportunity to look back and draw parallels with highly emotive historic poisonings with opium, or the prevalence of sulphuric acid for infanticide.⁸⁴

Apart from the different chemicals used, other factors have been considered when studying the deliberate use of chemicals to harm children: in addition to retail networks, the home environment, and knowledge about chemistry and physiology, the health care system has been held responsible. Indeed, Meadow has claimed that it was Britain’s attractive and attentive health care environment, not the availability of drugs or chemicals, nor any specialised knowledge of their toxicity, which created the practice of non-accidental poisoning.⁸⁵ A poisoner who used household chemicals to induce illness and feed their own “hospital addiction”, that is to say a compulsion to be at the centre of attention, was quite different from one who used salt to punish a child, or to emotionally manipulate a spouse or partner through the

⁸⁰ Roy Meadow, “Munchausen Syndrome by Proxy: The Hinterlands of Child Abuse,” *The Lancet* (13 August 1977), 343-345; Roy Meadow, “ABC of Child Abuse: Poisoning,” *BMJ* 298 (1989): 1445-1446.

⁸¹ Roy Meadow, “Non-Accidental Salt Poisoning,” *Archives of Disease in Childhood* 68 (1993): 448-452.

⁸² Douglas Pickering et al., “Non-Accidental Poisoning and Child Abuse.”

⁸³ A.N. Williams and N.K. Griffin, “100 Years of Lost Opportunity. Missed Descriptions of Child Abuse in the 19th Century and Beyond,” *Child Abuse & Neglect* 32 (2008): 920-924.

⁸⁴ Wynter Blyth and Wynter Blyth, *Poisons: Their Effects and Detection*, 89.

⁸⁵ Roy Meadow, “Munchausen Syndrome by Proxy,” *Archives of Disease in Childhood* 57 (1982): 92-98.

child's sickness. Although Meadow and to some extent his theory of Munchausen syndrome by proxy became discredited,⁸⁶ the reasoning that welfare systems are integral to the existence of the phenomenon of deliberate poisoning chimes with Chris Millard's explanations for the changing patterns of self-harm in Britain.⁸⁷

Ideal users

In addition to Neathercoat's users, another type of user has appeared throughout the thesis: the ideal user. These users appeared prominently in the advertising and advice literatures that have been drawn on extensively during this research. Examples include the users imagined by the producers of chemicals, then depicted in advertising and usage instructions. The advertising industry depended on market research to build up profiles of their ideal users, whereas manufacturing companies and regulatory bodies relied on reports of accidents to help construct imagined users in their warnings and instructions. Ideal users could also be real individuals who shared tips for getting the best out of chemicals, perhaps even famous celebrities, or those who belonged to an organisation such as the Consumers' Association, which tested, compared and endorsed products.

By illustrating the ideal uses and users, the misuses and misusers are simultaneously evoked, as it is almost impossible to describe correct behaviour without reference to that which is incorrect. Tables 4.2 and 5.1 both described the types of users that featured in advertising. Quite often however, adverts did not feature any users, and potential users were addressed as "you", which allowed every viewer of the advert to imagine themselves using the advertised product.

Real users, who provided personal evidence or testimonials about products, for instance in the garden press, on radio or TV, could also be ideal users, such as Percy Thrower, who had been a household name since 1947. He gave gardening advice on BBC radio, and his columns on the subject appeared in the *Daily Mail*, the *Mirror* and the magazine *Amateur Gardening*; he published gardening books, as well as being lead presenter on the BBC television show *Gardeners World*. When ICI

⁸⁶ A.W. Craft and D.M.B Hall, "Munchausen Syndrome by Proxy and Sudden Infant Death," *BMJ* 328 (29 May 2004): 1309-1312.

⁸⁷ Chris Millard, *A History of Self-Harm in Britain* (Basingstoke: Palgrave Macmillan, 2015).

incorporated Thrower's image and testimonial into their adverts for garden chemicals, they aimed to capitalise on his "brand" and the trust people had in him.⁸⁸ Other celebrity ideal users were Antarctic explorer Herbert Ponting, who had endorsed Burroughs' Tabloid developer tablets, actresses Nanette Newman for Fairy Liquid⁸⁹ and Molly Weir for Flash floor cleaner. However, the cleaning chemicals studied in Chapter 3 were not promoted by celebrities, and the use of chemical cleaning products was portrayed as done by everyday housewives. The difference then, is that the gardening and photography products which fostered these associations were promoted by emphasising that professional gardeners and professional photographers used them.

Gendered users

The analysis of how chemicals used for gardening and photography were promoted through their associations with professionals, whereas products for housework were not, exemplifies a difference based on work and gender. The case studies selected for research were chosen in order to include women, through their performance of housework, and men because of their involvement in gardening and other hobbies at home. Although home processing was expected to be carried out predominantly by young men and youths, professional women were also evident in the source materials, which served to emphasise that the segregation of men and women by domestic activity was not strict.

What has become evident during this research, is that gardeners and photographers received more precise information about chemicals and how to use them, than was provided to women about the chemicals they used in housework. Another difference between men and women's use of chemicals was that cleaning with chemicals was an obligation, whereas weeding and developing photographs with chemicals were part of more pleasurable pastimes. Women were likely to have to use chemicals amidst distractions, whereas men using chemicals as part of their

⁸⁸ "To get plenty of vegetables, I give them plenty of help," *Daily Express*, 04 September 1977, 22; "Fast and easy," *DM*, 16 April 1977, 31. In both adverts, Thrower is shown holding his pipe.

⁸⁹ <http://www.imdb.com/name/nm0628216/> (accessed 20 September 2016); http://www.heraldscotland.com/opinion/14281199.Not_just_a_flash_in_the_pan/ (accessed 20 September 2016).

hobbies could legitimately claim time away from the family and other domestic demands, which enabled them to use chemicals without interruption. Additionally, women were expected to protect children from the chemicals used in the home.

The knowledge that some sub-lethal doses of chemicals used in the home (other than medicines), might unintentionally affect fertility, or the development of an unborn child, therefore placed women's responsibility to protect children from chemicals even earlier than the inquisitive children stage.⁹⁰ However these types of concerns were hardly ever referred to in the popular media or the medical press between the 1930s to the 1980s. In demonstration of the fact that exposure during normal chemical use was not a problem, photographer Elisabeth Chat described how, in 1952, she worked in the darkroom throughout her first pregnancy. Chat was confident that her materials and working methods did not endanger her or her unborn child. She clearly revelled in working as a photojournalist which so few women were doing, gleefully rebelled against the confinement her grandmothers would have expected her to take, and even recalled her labour starting in the darkroom. Chat explained that after the birth, she continued to process photographs as she found that running a photography studio and darkroom from home was a more viable career than photojournalism, which was too unpredictable to balance with the needs of a young family.⁹¹ The effect of domestically used chemicals on men's fertility was similarly unimportant, although occupational exposures were of concern.

Concern about exposure to chemicals was more evident in gardening when it related to the use of pesticides, linked in part to evidence of female cancers, such as Rachel Carson's breast cancer, and to teratogenic effects of herbicides contaminated with dioxin that had been used in Vietnam. However, Lisa Taylor's investigation into the gendered nature of gardening said nothing about health concerns in relation to either the use or non-use of garden chemicals.⁹² Herbicide

⁹⁰ Sarah Vogel, "From 'the Dose Makes the Poison' to 'the Timing Makes the Poison': Conceptualizing Risk in the Synthetic Age," *Environmental History* 13 (2008): 667-673.

⁹¹ Elisabeth Chat, "Oral History of British Photography," interview by Alan Dein (1994), track 5 26.39, track 6.

⁹² Lisa Taylor, *A Taste for Gardening: Classed and Gendered Practices* (Oxford: Routledge, 2016), 66.

adverts, as seen in Chapter 4, most often pictured a man applying weedkiller. From the 1960s, women began to be included in adverts for garden chemicals, the timing of which coincided not only with the increasingly active pursuit of gender equality, but also heightened awareness of the health effects of chemicals, especially on women of reproductive age. Adverts continued to depict men weeding and caring for the lawn, whereas women were shown spraying the garden with chemicals to kill pests. There are two interpretations of this situation. One is that killing insects fitted better with the idea that women nurtured and protected their garden, whereas killing plants was too uncharacteristic. The absence of women in paraquat adverts can be explained by the facts that paraquat was rendered inactive by soil, and it was not associated with environmental persistence or accumulation like insecticides such as DDT were, so women were not needed to denote their safety.

Turning now to the language used regarding chemicals, gardeners and photographers were instructed to use chemicals in precise quantities, whereas housewives were not. When men dealt with grains and ounces, women usually estimated the size of “little lumps” of chemicals in comparison to items of roughly uniform size such as a walnut. In part, this distinction was made because less accuracy was demanded in the use of chemicals for household cleaning than for photography. The idea that women were given inexact measurements because they handled less dangerous chemicals is incorrect, because they were also instructed to use poisons imprecisely, for instance “place a tiny pinch of salts of lemon over the stain”. This instruction was followed by a sentence which reminded the user that the chemical, confusingly also known as salts of sorrel, was poisonous and had to be handled carefully.⁹³ The phrase “a pinch” suggests that the substance was amenable to handling in this way, so long as the user diligently washed their fingers afterwards. To some degree, such a statement suggests confidence in the competence of the housewife to handle a poisonous chemical appropriately. Yet in 1975, another advice book declared that the chemically similar oxalic acid was so poisonous it was “not advisable to have it in the home”.⁹⁴ The poisonous nature of

⁹³ *The Home-Lovers Encyclopedia* (London: Amalgamated Press, 1933), 870.

⁹⁴ Eva Ling, *Modern Household Science* (London: Mills & Boon, 1975), 196.

oxalic acid had not changed between the 1930s and the 1970s, and instances of either accidental or deliberate poisoning with oxalic acid were very rare, but what was acceptable in the home, and the expected behaviour of the home user had clearly changed. It is hard to explain why, because users and commentators have not explicitly reflected on this point, but the availability of safer alternatives which removed the need for potentially dangerous chemicals to be kept at home must be involved in a recalibration of what was believed to be a suitable chemical to use at home. This point suggests scope for more targeted research, encompassing other chemicals, which could illuminate such a change.

Nevertheless, the experience of unpaid work in the home and paid employment elsewhere, which maps onto gender, appears to influence the way chemicals were viewed and used. The precise details given for photographic and gardening chemicals is linked to their professionalised counterparts, and indicates that the efforts of home economists to insist on home management as a skilled profession failed. The idea that hand weeding is time consuming and expensive depends on how the person doing the weeding values their time. Because weeding could be fitted in among other tasks, it complemented the fragmented domestic experience of modern housework, so women doing unpaid housework might appreciate the opportunity to spend a productive “odd moment” in the garden.⁹⁵ However, men were encouraged to approach weeding in a work-like way for extended periods of time,⁹⁶ which relates to the single-minded focus that men were expected to exhibit in their paid work.

Another difference that can be rooted in workplace behaviour versus the home, is that using chemicals at home was more difficult to do without interruptions, which could cause accidents. Eliminating distractions, such as children, pets, telephone calls or having to answer the door, made it more probable that all the steps that contributed to the safe use of chemicals, including not leaving them unattended and storing them correctly after use, would be completed. Home

⁹⁵ Marion Cran, *Gardens of Character* (London: Herbert Jenkins, 1939).

⁹⁶ Reginald Beale, *A Complete Guide to the Making and Maintenance of Lawns and Greens for All Purposes* (London: Cassell, 1931), 78.

processors established this privilege for themselves, more so than the other users, and relished quiet, private time working in their darkroom. Learning how to process photographs, or sharing the space with a companion who was also engaged in developing, were exceptions in what was otherwise a solitary activity, but what was distinctive was the fact that whoever was in the space was focused and intent on using the chemicals correctly.

In another work related topic that relates to gender, men were more often in a position to take chemicals from work. Some users perceived that taking chemicals home from work was a way of saving money. Jason Ditton has differentiated between three types of taking without authorisation from the workplace – perks, pilfering and stealing – and has outlined the motivations for it. A perk is an openly acknowledged benefit of working. Theft is classed as pilfering when the goods are of low value, are taken for the pilferer's own use, and the theft was not premeditated. Stealing is defined by its premeditated nature, but also includes taking goods in large quantities, repeatedly taking small items and reselling them. Ditton has called pilfered items "imaginary, emotional extra wages", and determined that it was usually cheaper for management to allow a certain amount of theft.⁹⁷ However, Hollinger *et al.* have identified another dimension to thefts which Ditton had neglected to include because he focused on the pilferer's own use or reselling. Hollinger described a fourth type of theft, which took place when goods were taken for altruistic, or socially-based reasons, to enhance relationships with associates, friends and family.⁹⁸

By limiting their study to the food industry, what Hollinger *et al.* and Ditton have not considered was the theft of something that could potentially have dangerous consequences, for instance, poisons like paraquat. Gramoxone would not have been given as a perk to factory workers because Gramoxone users were supposed to be agricultural or horticultural professionals. Yet accidental poisonings

⁹⁷ Jason Ditton, "Perks, Pilferage, and the Fiddle: The Historical Structure of Invisible Wages," *Theory and Society* 4 (1977): 51, 53, 57.

⁹⁸ Richard C. Hollinger et al., "Deviance in the Fast-Food Restaurant: Correlates of Employee Theft, Altruism and Counterproductivity," *Deviant Behaviour: An Interdisciplinary Journal* 13 (1992): 161, 176, 179.

related to such thefts occurred and there were no calls for employers to crack down on pilfering.

An example of a socially-based theft with tragic consequences is the 1968 case of six-year-old Beverley Pollitt. Her father was an ICI employee at Runcorn and had asked another ICI employee if they could get some weedkiller for him. Although neither personally worked on Gramoxone production, Mr Pollitt's friend duly located and took some that had been stored for use around the site. Unfortunately, the Gramoxone came into the Pollitt's home in a lemonade bottle which Beverly drank from, and subsequently died.⁹⁹ This was not an isolated instance. The "liberation" of paraquat formulations from the ICI plant was not uncommon: it "leaked out of the plant like water off a roof" according to Paul Meara who lived in the area.¹⁰⁰ Young men working in manual jobs appeared to be especially susceptible to taking Gramoxone home for their friends and generously sharing it with their acquaintances. ICI and the Pesticides Advisory Committee acknowledged that accidents often happened when people tried to save the expense of buying Weedol, the granulated domestic version.¹⁰¹

Indifferent users

Although accidents and murders involving chemicals and the introduction of new chemical products were newsworthy occurrences, individuals' diaries, biographies and oral history interviews hardly ever mentioned chemicals or products. The absence of specific comments about the ordinary use of chemicals for cleaning, killing weeds or processing photographs in these sources can be interpreted as indifference to chemicals. This was the case even when diarists and interviewees were invested in generating historical records. For example, artificial intelligence pioneer Jean Hayes addressed "future historians" in her accounts: she was motivated to provide a snapshot of home life, and portray the food consumed

⁹⁹ City of Liverpool Coroners' Depositions, 12 July 1968 in HO 305/32, TNA; "Child died from weed killer," *TT*, 14 August 1968, 2; Arthyr Redford, "Bottle Said 'Lemonade' but It Killed Beverley," *DM*, 14 August 1968.

¹⁰⁰ P. Meara, Personal communication, email 28 January 2014.

¹⁰¹ P.N.M. Moore, "26 July 1968 Brief Note on the Present Position with Paraquat," in MAF 284/307, TNA.

and everyday goods used by an academic power couple in the 1970s and 80s.¹⁰² However, of more importance to Hayes, was careful legacy management, which involved recording the personal conflicts that came from working in a field dominated by men.

Even when Mass Observation diarists were specifically prompted to record information about housework, gardening and hobbies, none of the respondents mentioned stain removal or the use of chemicals instead of commercial products. When respondents exercised the opportunity to reflect on housework, they wrote about the gendered division of household labour and reasons for it, which the directive had specifically prompted participants to consider. Focussing on this area suggests that concerns about gender equality were considered by the users themselves as more pertinent and worthy of record than their domestic uses of chemicals.

Even when chemicals could have been given greater priority, for example in the Oral History of British Photography project, the details were either so obvious or mundane to both the interviewer and the interviewee that they did not warrant further comment about what it was like to buy and use vaguely referred to “chemicals” or “powders”. Although these photographers could not have processed their images without chemicals, they said very little about them. Brands of chemicals were not mentioned, although switching brands could be difficult and time consuming,¹⁰³ but cameras were proudly named, reflecting the primacy of cameras to photographers. Nevertheless, the use of the word “powders” strikes a chord with the gardeners and housewives who referred simply to “sprays”, whether these sprays were to kill insects, to remove stains, to clean ovens or windows or to deliver weedkiller.

Non-users

Non-users have been glimpsed throughout the study of users and misusers. This section pays attention to them, because those who did not use chemicals help

¹⁰² Jean Hayes, “Housekeeping Accounts Book,” 1977, Add MS 88958/5/13, British Library.

¹⁰³ Dave Butcher, “Ilford and Photographic Chemicals,” interview by Cat Rushmore (23 September 2015).

to tell us about their place in everyday life, through illuminating the societal impacts of chemicals. The reasons for being non-users included not seeing a need to use particular chemicals, or the cost being prohibitive, such as the working class gardeners Margaret Wiles studied.¹⁰⁴ Additionally, users of certain chemicals actively avoided others for health reasons, as metol-sensitive photographers did.¹⁰⁵ When chemical avoidance became enmeshed with personal wellbeing and stewardship of the planet, it became part of an ideology and these non-users could be notably passionate or committed, even before the environmentally enlightened 1960s. In 1939, Marion Cran wrote of her “deep-rooted instinct of a woman who is both a mother and a midwife” which made her question the use of agricultural chemicals in her garden and turn towards the alternative methods advocated by Rudolph Steiner.¹⁰⁶ In the first two decades of the twentieth-century, Steiner, regarded by some as an eccentric, developed and promoted a holistic view of gardening and agriculture known as the biodynamic method. This method opposed the quick fix promised by the increasingly popular chemical fertilisers, and instead optimised planting times as well as natural methods to improve soil health, such as composting.¹⁰⁷

At times the division between users and non-users could verge on tribal, such as when *Practical Gardening* (PG) started to become less pro-chemical than it had been. Under Stan Russell’s long and steady editorship, even quotations from members of the Nature Conservancy group could support chemical use.¹⁰⁸ Russell was open about the fact that the Association of British Manufacturers of Agricultural Chemicals had appointed a full-time information officer in order to persuade gardeners that chemicals did more good than harm, therefore PG readers would get news about chemicals.¹⁰⁹ However, at the same time the magazine received and helpfully responded to readers’ requests for alternative products, indicating the

¹⁰⁴ Margaret Wiles, *Gardens of the British Working Class*, (New Haven: Yale University Press, 2014).

¹⁰⁵ F.J. Mortimer, "Topics of the Week: Metol Poisoning," *APC* 23 March 1938, 303-304.

¹⁰⁶ Cran, *Gardens of Character*, 220.

¹⁰⁷ Philip Conford, *The Development of the Organic Network* (Edinburgh: Floris Books, 2011), 77-92.

¹⁰⁸ Stan Russell “Why You Have Weeds,” *PG*, September 1971, 3.

¹⁰⁹ “Looking Ahead,” *PG*, December 1963, 17.

varied attitudes towards chemicals and their use. For instance, vegetarian G. Walker from Staffordshire wanted a fertiliser that was not based on “chemicals”, meaning presumably, synthetic chemicals, nor by-products of the meat industry, so was recommended the plant food Maxicrop, made from seaweed.¹¹⁰ When Geoff Hamilton became editor in 1976, he introduced a more explicitly organically-focused approach, then handed over the editorship to Mike Wyatt, who shared his approach to minimising the use of garden chemicals.¹¹¹

The moderate and appropriate use of chemicals continued to be encouraged in *PG*, thereby not alienating the users or advertisers, although the number of adverts for all kinds of chemical products had declined by the 1980s. The shift away from chemicals was at times carried out in an obnoxious manner. For instance, Hamilton published a letter from Francis Hayhoe, allegedly in the name of airing balanced perspectives but really to encourage a metaphorical lynching of someone who disparaged environmentally-conscious “cranks”.¹¹² The letter could have been edited or simply not been published, but printing this view meant that in the following issue Hamilton could triumphantly report that in the numerous responses to Hayhoe’s letter, none of the correspondents had supported his argument.¹¹³ George McKay has drawn attention to the fact that the publishing and broadcast media have made organic gardening methods, and the ideology that accompanies them, mainstream.¹¹⁴

No similar transformation in attitude was evident in publications that addressed the housewives or photographers. Although digital photography started to become available in the 1980s and the benefits of not having to handle chemicals were voiced, there had been non-users of photographic chemicals since the advent of commercial processing services. Therefore, at first, digital processing was another alternative aspect to the activity, and photographers were still regularly encouraged

¹¹⁰ G. Walker, “Chemical Free Product,” *PG*, June 1963, 17.

¹¹¹ Geoff Hamilton, “Comment,” *PG*, January 1981, 2.

¹¹² Francis Hayhoe, “The Opposite View,” *PG*, July 1980, 7.

¹¹³ P.A. Walsh, “Friend of the ‘Friends’,” *PG*, August 1980, 7.

¹¹⁴ George McKay, *Radical Gardening: Politics Idealism & Rebellion in the Garden* (London: Frances Lincoln Limited, 2011), 51.

to try processing their own photographs. Early digital photography was expensive, whereas chemical kits, including for colour processing, were increasingly reliable, and ever cheaper and easier to use. The practice of chemical processing and the identity of “home processor” existed alongside the digital photography because appreciation of the chemical methods continued to be cultivated as a way of connecting to the history of photography, and the magical way in which the latent image appeared from a blank sheet would never lose its appeal.

Apart from preference, some non-users were forced to avoid particular chemicals because they had developed physical reactions to them. It was possible to give up otherwise useful chemicals or products because there were alternatives. In Chapter 5 there was evidence that photographic chemical users accepted their painful condition of metol poisoning stoically, as part of the hobby and it guided their choices of chemicals.¹¹⁵ In Chapter 3, the manufacturers of Carbosil, amongst other products, blamed soda for making women’s hands red,¹¹⁶ and suggested that Carbosil should be used instead. Other domestic users who developed eczema in response to irritant chemicals continued to use them but with greater care, like the incautious Weedol users who splashed the herbicide on their skin.¹¹⁷

A minority of users experienced life-changing systemic reactions to chemicals that other people could tolerate.¹¹⁸ Although multiple chemical sensitivity (MCS) was viewed with scepticism and suspected to be psychogenic,¹¹⁹ those experiencing severe symptoms came to see themselves as “canaries in the mine” or as “prophets” for a future in which there were ever more chemicals used in the home.¹²⁰ These now non-users joined the Chemical Victims Club or Action Against Allergy (AAA), in

¹¹⁵ F.J. Mortimer, “Topics of the Week: Metol Poisoning,” *APC*, 23 March 1938, 303-304

¹¹⁶ “Carbosil,” *The Sunderland Echo and Shipping Gazette*, 31 May 1933, 4.

¹¹⁷ “Medical Record of Weedol Use,” MAF 284/307, TNA.

¹¹⁸ Andrew Veitch, “A Growing Number of Young People Are Totally Incapacitated Because of Pollution,” *TG*, 10 February 1982, 17; Lynda Brown, “Victims of the Century,” *TG*, 15 May 1987, 20.

¹¹⁹ Edward Shorter, “Multiple Chemical Sensitivity: Pseudodisease in Historical Perspective,” *Scandinavian Journal of Work, Environment & Health* 23, supplement 3 (1997): 35-42.

¹²⁰ Mark Jackson, *Allergy the History of a Modern Malady* (London: Reaktion Books, 2006), 112, 149, 173, 183; Julienne Lipson, “Multiple Chemical Sensitivities: Stigma and Social Experiences,” *Medical Anthropology Quarterly* 18 (2004): 200-213.

order to gain and share information with people in similar predicaments. Both organisations had been founded with the support of ex-general practitioner, *Daily Mail* doctor and psychiatrist, Richard Mackarness.¹²¹ Such organisations acted to empower individuals who had suffered from their use of chemicals, through facilitating the recognition of MCS and how to deal with it. In the 1980s, the *Guardian* frequently carried articles about clinical ecology and chemical allergy, locating this phenomenon within the preoccupations of relatively affluent people who had the cultural capital to seek specialist help. Articles and books on the subject were educational: they enabled people to be more aware of reactions they linked to chemicals, named the condition, which meant that it could be discussed, and empowered individuals to act on their observations. Self-monitoring, self-testing and avoiding chemicals became part of MCS sufferers' lifestyles.

What is particularly interesting is the fact that bicarbonate of soda and washing soda, the mildest members of the soda family, profiled in Chapter 3, were recommended as chemicals that could usually be tolerated by MCS-affected users for laundry, personal hygiene and general domestic cleaning.¹²² However, this was not uniformly advised. For example, Amelia Nathan-Hill, an allergy sufferer and co-founder of AAA, followed her doctor's advice to find a brand of detergent that she did not have an adverse reaction to. Nathan-Hill was surprised that Lux, supposedly one of the mildest detergents, caused a reaction, but she neither tried testing her reaction to sodas nor listed them in the resources section of her book about her experiences.¹²³ Mackarness, with whom Nathan-Hill was in contact through her work with AAA, advocated a return to simple pre-war conditions in order to avoid synthetic chemicals, especially fragrances. In doing so, Mackarness, along with clinical ecologists and other proponents of MCS, reinvented sodium bicarbonate and sodium carbonate as hypoallergenic options. Using soda, therefore, could be

¹²¹ Richard Mackarness, *Chemical Victims* (London: Pan Books, 1980); Roland Hill, "Obituary: Dr Richard Mackarness," *The Independent*, 04 April 1996, <http://www.independent.co.uk/news/obituaries/obituary-dr-richard-mackarness-1303347.html> (accessed 20 September 2016).

¹²² Mackarness, *Chemical Victims*, 130, 184-185.

¹²³ Amelia Nathan Hill, *Against the Unsuspected Enemy* (Bognor Regis: New Horizons, 1980), 78, 91.

equated to improving or protecting health, not just saving money or the environment.

Another type of committed non-user were the parents of children who died from solvent abuse, for example the mother of Darren Barber who became involved in educational anti-solvent abuse work.¹²⁴ In contrast, the relatives of people accidentally poisoned at home by herbicides did not set up campaign groups. Domestic users of Gramoxone, who knowingly transgressed boundaries and clearly violated the multiple instructions for safe use, tended not to be among the voices calling for bans. They did not call for, or seem to expect, absolute safety or even change.

An exception was George Staples, who wrote to his MP following the inquest into his son Robert's suicide. Robert had taken his father's small amount of illicitly decanted agricultural strength paraquat, and Staples declared that he was "astonished... and disappointed" that there was no recommendation to withdraw the weedkiller from the market.¹²⁵ This letter is the only one from a relative of a paraquat victim that appears in the Home Office archives, which makes Staples unusual. Staples' belief that the chemical should be taken off the market also set him apart from other bereaved relatives, who left very few traces. However, newspaper reports of poisoning inquests occasionally carried truncated statements of the family's regret. For example, Mr Parsons, whose young daughter Deborah was accidentally poisoned by the Gramoxone he brought home in a Pepsi bottle, said of the accident "It was my own stupidity".¹²⁶

Paraquat remained on the market and, out of all the case studies, offers the clearest demonstration of how imagined, and real, misuse affected the products available for home use. The decision to produce a granulated form of the herbicide, Weedol, for domestic users was based on members of the regulatory committee imagining that amateur gardeners would not be able to handle the concentrated liquid Gramoxone without splashing it. Then, as accidental poisonings occurred with

¹²⁴ Peter Fry, "Aerosols," HC Deb *Hansard* (20 December 1988): vol 144 cc419-26.

¹²⁵ Gordon Staples, "Letter to Mr Onslow," 1971, HO305/32, TNA.

¹²⁶ "Girl drinks first and dies," *DM*, 30 September 1972, 9.

Gramoxone, which had been chosen by domestic users instead of Weedol, this too was changed to prevent misuse, by adding stenching agents and an emetic.

Users, but especially misusers, therefore informed the labelling, packaging and even formulation of domestically used chemicals and products. However, misusers appeared to be highly resistant to the changes made, and often still found ways to misuse chemicals, or switched to misusing other types of chemicals, as solvent abusers did. Users, misusers and non-users have been shown to be creative and determined, even if they have not always wanted to speak or write in detail about what they did, or why.

Chapter 7: Conclusions

I have argued that domestic chemicals have been overlooked historically, both in academic writing and in museum displays. Chemicals have been considered trivial, yet their misuses have determined what chemicals have been available to home users. To address this blind spot, I have therefore described some of the chemicals used at home between the 1930s and the 1980s, outlined some of the uses and misuses of those chemicals, and related them to changes in their availability. In doing so, I have highlighted the ambivalent attitudes towards chemicals, and revealing yet another reason for domestic chemicals being neglected in the historiography and museum collections. Focussing on the home makes it possible to examine users absent from workplaces, whilst acknowledging that homes are workplaces too. Additionally, I considered the relevance of branding, whereby chemicals became known better by their brand name or product name than their chemical name.

No single method yielded the evidence about users and chemicals I sought, so I used a patchwork of sources and approaches. I looked at three main user groups; housewives, gardeners, and home photographic processors, chosen to include women, men and youths. I discovered that there was greater evidence of misuse than that for ordinary use, and there was more discussion about potentially dangerous chemicals than innocuous ones. Additionally, the sources confirmed that another, often unintended, user group ought to be acknowledged in this thesis as especially influential: children. Misuse (including by children) was to some extent predicted by manufacturers, so they developed, marketed, and altered their products accordingly.¹

Chemicals were used, and misused at home to solve problems ranging from blocked sinks, greasy dishes, stained clothes, unsightly weeds, unsatisfactory commercial photo processing, defective relationships, or unbearable personal situations. The common uses and misuses of chemicals in the home can be interpreted as communicative: chemicals were used to demonstrate care, to express distress, or to threaten and hurt people. Solvent abusers, for example, communicated a multitude of messages including

¹ "Pesticides and Posterity," *Horizon*, BBC Television, first aired 30 May 1964 (accessed British Film Institute).

rebellion against parents, curiosity, conformity with their peers, even dissatisfaction with their situations, by seeking cheap highs. The meanings of these uses and misuses were reinforced by dissemination in advertisements, advice literature, and news features.

Repetitive media coverage could amplify chemical misuse, and this was particularly true of paraquat. This chemical was marketed as a single-use herbicide, but was also used for suicide and murder, sometimes by the gardeners and farmers it was developed to help, but also by many people who had no intention to use it as a weedkiller. After accidental deaths from paraquat were reported, suicides from paraquat poisoning were also considered newsworthy, and only after that did paraquat become misused for murder. The link between heightened awareness of paraquat's acute toxicity and its misuses appears to be clear, but the situation was not so straightforward with other chemicals.

The most important factor affecting the availability of chemicals was whether a chemical could be administered as a poison and used for murder. For instance, when inherently bitter-tasting yet poisonous and potentially explosive sodium chlorate was involved in poisoning, it did not result in a furore, despite being marketed as harmless, whereas paraquat poisonings caused great upset. The strong paraquat product Gramoxone had been approved as safe for farmers and professionals to use, yet became associated with distressing, slow deaths and could be surreptitiously administered. The misuse of Gramoxone and the actions taken to prevent it echo Bartrip's work on the fear of secret poisoning with arsenic. By preventing secret poisoning, accidental poisoning was also addressed, and to some extent so was the use of chemicals for suicide. Murderous poisonings were undertaken by men and women,² but in addition it shows that men also use domestic chemicals for suicide, a fact downplayed by Clarke who presented household poisons as "women's" methods.³

Useful domestic chemicals which were potentially also poisons or explosives were accepted in the home, because when the chemicals were used by housewives,

² Katherine Watson, *Poisoned Lives: English Poisoners and Their Victims* (London: Hambledon and London, 2004), 45, 209.

³ Michael Clarke, "The History of Suicide in England and Wales, 1850 - 1961, with Special Reference to Suicide by Poisoning," (Ph.D., Oxford University, 1993), 143.

gardeners and home processors as intended and instructed, they were safe. In the hands of users, most often children, who did not recognise either the substance or the consequences of carelessness, chemicals could become dangerous. The involvement of children with chemicals, such as making homemade explosives, committing solvent abuse and having accidents, was the next most important factor that stimulated action to control access to chemicals. Age-restricted sales appeared to work because children were easier to deny products to than adults, whereas the methods that depended on adults' honesty, such as signing Poison Books, were easily overcome by deceitfulness.

By not only studying harmful chemicals, but also making case studies of innocuous chemicals, such as washing soda, phenidone and metol, to which only a few people were allergic, this thesis acknowledges that some chemicals were almost impossible to misuse. Home processors did not intentionally misuse metol and phenidone, as doing so would have resulted in poor results, or in the case of flash, in injuries. There does not seem to have been a problem with children misusing flash powder in homemade rockets, although this conclusion may be an artefact of reports from medical journals and newspapers. These photographic chemicals were, in the domestic environment at least, single-purpose: they were not used elsewhere in the home, or for purposes other than developing. By reason of its oxidising nature, the herbicide sodium chlorate was a multipurpose chemical, although this property was misjudged by children and misused by terrorists. Washing soda was used for many beneficial uses in the home but misuse that caused harm was not an issue, whereas carbon tetrachloride, which as a volatile solvent could remove grease and dirt from many different household textiles, furnishings and accessories, was intentionally misused by solvent abusers.

Nevertheless, some chemicals, both unbranded and branded, could become unavailable (or available) because of supply issues, rather than demand for safer or improved products. For instance, sulphur shortage affected the production of metol and resulted in the use of phenidone being promoted, and steel shortage affected the production of soda and encouraged the adoption of new detergents. It was requests for Carbosil's manufacturers to make a more uniform soap that led to the discontinuation of the soda-like product, not a lack of demand for it. More often though, chemicals remained available alongside branded products as one among many alternatives to choose from. Choice between those alternatives was guided by individual

circumstances, such as budget, what was available that day, but also by considering the needs of various members of the household, their personal sensitivities and preferences, which related to managing risk in the home.

Risk, safety and responsibility

The relatively low number of domestic accidents with chemicals between the 1930s and 1980s has resulted in this area being overlooked in the historiography of accidents.⁴ Nevertheless, the British population has engaged in domestic activities that resulted in being harmed by chemicals, even if such incidents often lacked the spectacle of traffic accidents. The accidents that occurred with chemicals in the home between the 1930s and the 1980s show continuity with the earlier period, although some of the chemicals, such as paraquat, were novel. Lapses in judgement and concentration, the root of so many accidents, cannot be eliminated by educational campaigns, improved labelling or awareness of potential dangers. They were however mitigated by packaging design, and the substitution of harmful chemicals or products by safer alternatives. Such changes did not have to be forced by government, although industries anticipated state intervention and acted to avoid strict constraints. However, changes that improved safety, even when such alterations had been demanded on behalf of users by advocates, were not necessarily announced or advertised by companies in these terms. Instead, attention was diverted away from safety and towards effectiveness, reflecting an unwillingness of users to think about the unavoidable risks in everyday life, described by Beck.⁵

The lack of thought about chemicals' risks and benefits, despite the fact that the mid-twentieth century was described as a "Chemical Era", is shown by a general absence of users' comments and descriptions in their biographies, diaries and oral history interviews about their experiences of using domestic chemicals. Finding widespread indifference towards chemicals and their use in the home between the 1930s and the 1980s highlighted the ambiguous position of many domestic chemicals. A number of factors appear to have resulted in indifference for many domestic users of chemicals.

⁴ Tom Crook and Mike Esbester (eds), *Governing Risks in Modern Britain: Danger, Safety and Accidents, c.1800-2000* (London: Palgrave Macmillan, 2016).

⁵ Ulrich Beck, *Risk Society* (London: Sage Publications, 1992) 75, 83.

These include the facts that chemicals are everywhere, there are many benign and useful chemicals, but also that toxicity does not always preclude usefulness. Chemicals can have strange, multiple and changing names, be hard to tell apart visually, or to detect without specialised tests. Ultimately though, they are inescapable, although people have tried to minimise or to change their uses of them.

For many British housewives, gardeners and photographers, the chemicals they used at home were literally unremarkable, even when they were touted by chemical companies as revolutionary, or necessary to complement camera and film technologies, or to relieve the burden of a tedious chore. Chemicals were not necessarily considered to be loaded with dangers, but nor were they entirely trouble-free. Different chemicals for case studies, such as insecticides, may have revealed users to be more engaged and vocal. However, it is important to look at examples of ordinary, everyday chemicals in order to be able to gain perspective on the negative sentiments that are associated with high profile and controversial chemicals. The study of the uses and misuses of ordinary domestic chemicals reveals that there has long been neither special fear nor any particular enthusiasm for chemicals, which suggests that the current public opinion of chemicals as “neutral”, is not a new development, but a sustained belief.⁶ The American reception of *Silent Spring* or attitudes to defoliants used in the Vietnam war must therefore not be taken as the baseline for the level of chemical awareness and discussion amongst the British public,⁷ and there is scope for further research that compares British domestic users and their advice literature with those in other countries.

Can one conclude that chemicals were taken for granted? Users did not sing their praises in oral history interviews, in biographies or diaries, but they were careful not to waste them and were concerned about not being able to get them. This is demonstrated particularly strongly with photographic chemicals. The users of ordinary household chemicals always had alternatives, the first of which was *not* to use a particular chemical. Photographers were flexible and resourceful; they had many recipes to turn to

⁶ TNS BMRB, “Public Attitudes to Chemistry,” Royal Society of Chemistry, 2015.

⁷ Mark Wilson, “To What Extent Was the British Reaction to ‘Silent Spring’ Indicative of a Tradition of Top-Down Environmentalism?,” (M.Sc., University of Northumberland, 2010).

if an ingredient was unavailable. There was no uproar among housewives when loose soda stopped being sold, because packaged soda was still available, in addition to many other products that performed like soda or even better. Gardeners had many different domestic herbicides, as well as hoeing or pulling up weeds. Additionally, the retail landscape changed: packaging loose chemicals for individual customers took time that chemists, shopkeepers and users could no longer spare. Most chemicals remained available for those who wanted them, and photographers proved that a minority were prepared to demand particular chemicals and to sign Poison Books for certain purchases.

Although the misusers of chemicals stimulated legislation, restrictions, systems of monitoring and recording such as the Poisons Information Service, the majority of users managed to operate safely and effectively, including in conditions where they did not have all the information. Even when products were labelled more informatively, whether the instructions and warnings would be read, understood, or acted upon remained uncertain. The instructions and warnings were rooted in common sense behaviours and precautions that ought to be easy to follow in the home, such as rinsing off a chemical that splashed on the skin. Users were assumed to draw on their common-sense about accidents that could happen in the home. In addition to paying attention to warnings or instructions associated with chemicals or products, users read advice literature, newspaper stories, or participated in formal training about accidents, and became aware of the accidents that could happen when chemicals were improperly stored and used at home. Unfortunately, extensive coverage of accidents also acted as inspiration to misuse chemicals, by providing a primer on how much of a substance would be fatal, what ingredients to combine for an improvised explosive, or by showing how easily restricted substances could be obtained, and guaranteeing that a story that involved chemicals and possible death would receive media attention. The continual connection between chemical misuse and media stresses the importance of ethical, responsible journalism, because although reporting on misuses of chemicals informed readers about the potential dangers of chemicals and how to avoid accidents, it could also influence others to imitate such misuses. The emergence of these patterns points to at least one potential practical application of this research: to emphasise in journalists'

training the existence of guidelines about ethical, responsible reporting in order to avoid imitative behaviour in suicide,⁸ explosives, murder and other misuses of chemicals.

Moving from deliberate to accidental misuse, advice about preventing domestic chemical accidents remained constant over time, essentially limited to attentiveness to one's surroundings and correct storage. The recommendation that individual domestic users could draw attention to a liquid's potential toxicity by, for instance, sticking pins through the cork stopper of the bottle, disappeared as mass-produced packaging technologies changed and alternative, safer products were marketed. Such a change embodied a shift in responsibility from users to producers, but this was not the only influence at work.

Another change in advice about accidents was that first aid instructions for treating poisoning at home became greatly simplified. This simplification reflected the fact that it was harder to establish what antidote might be suitable because there were more chemical products in use, and it was often unclear what the ingredients in those products were. Additionally, many commercial products available between the 1930s and 1980s were actually less harmful than overzealous first aid,⁹ and that professional treatment, by either going to hospital by car or phoning for help, was increasingly accessible.

Safer products, improved packaging and better treatment following misuse came about through the activities of organised professional associations, such as doctors and pharmacists, chemical companies, through the work of individual MPs interested in consumer choice and domestic safety, and of the committees and working parties assembled to investigate issues as they arose. These official, political groups were considerably more powerful than individual users, interest groups or alliances of committed non-users,¹⁰ but letters from users, non-users, and relatives of misusers filed in government folders, along with discussion about and subsequent responses to them,

⁸ Catherine Crane et al., "Suicide and the Media: Pitfalls and Prevention," *Crisis* 26 (2005): 42-47.

⁹ Neil C. Fraser, "Accidental Poisoning Deaths in British Children 1958-77," *BMJ* 280, no. 6231 (1980): 1596-1598.

¹⁰ Matthew Hilton, *Consumerism in Twentieth-Century Britain: The Search for a Historical Movement* (Cambridge: Cambridge University Press, 2003), 168, 170, 173; Matthew Hilton, *A Historical Guide to NGOs in Britain: Charities, Civil Society and the Voluntary Sector since 1945* (Basingstoke: Palgrave Macmillan, 2012), 17.

show that they were heard. Most of their interventions attempted to improve the immediate safety of users whilst maintaining a market for chemicals and chemical products, rather than to ban entire classes of chemicals. There was no turning point when compounded products could be said to have displaced the basic chemicals, nor when (or even whether) domestic users expected manufacturers to take on responsibility for safer chemical products. Even though individual users rarely approached companies to demand change, by having accidents that were tabulated and analysed, joining consumer groups, or contacting MPs or government departments users and misusers were at the heart of efforts to improve the safety of chemicals used at home.

However, consumer advocates did not seek to transfer all responsibility to the producers because they also implored users to follow instructions as well as to exercise their own judgement and caution. Consumer protection initiatives did not seek to coddle consumers or do all the work for them. Instead, they aimed to empower users to make suitable choices for their own circumstances and to contact producers for information, something that hobby users of chemicals such as home processors had already been encouraged to do.

Empowerment then is another E to add to Judith Green's three E's of accident prevention: education, enforcement and engineering.¹¹ Users regularly circumvented restrictions or ignored education, that is to say advice or warnings, and enforcement was difficult to uphold. Increasingly though, users could educate themselves as advice became available through the manufacturers, sales people, product packaging, and advice literature. Dissatisfied users engineered their own solutions to problems, which was a form of empowerment. Likewise, the self-testing, monitoring and avoidance of certain chemicals that allergy sufferers practised can be interpreted as self-empowerment, which enabled them to understand what was making them unwell and to manage their symptoms. Manufacturers have shown that they take empowerment seriously, and recently S.C. Johnson, manufacturer of a range of household cleaning products, has taken the step to provide comprehensive information regarding chemical

¹¹ Judith Green, *Risk and Misfortune: A Social Construction of Accidents* (London: UCL Press, 1997), 104-111.

ingredients on a user-friendly corporate website. Although they do not reveal historic changes in product composition, the existence of this resource reveals that there was demand from users or potential users for more detailed information. Users of this resource are not indifferent, and it would be interesting to know more about them and their motivation.¹²

Incorporating the concept of empowerment highlights the fact that individuals understood that they could personally do something to address harm from chemicals and acknowledges the centrality of users, in particular the parts which their agency and responsibility can play in creating a safe product through use. Manufacturers and regulators have imagined, observed, consulted and analysed users to ensure that the products they choose are worthwhile, appropriate and reasonably safe, even building in desirable functionality and usability to packaging to eliminate the need to decant, for example.

It is in the interests of producers and retailers to be concerned about the safety of their users, and to ensure that products that can be used safely, but are occasionally harmful, can be sold. Neither the Poisons Lists, the Pesticides Safety Precautionary Scheme, informal agreements or legislated restrictions proved to be fully efficient at protecting users, but they did show that government and industry were actively involved in doing at least something. These measures acted to show awareness, to signal danger and to act as a deterrent, rather than truly prevent access to chemicals.

Studying the domestic uses, misuses and subsequent adaptation of chemical products by manufacturers, reveals that the relationship between producer and user is dynamic and not one-way. Although representatives of the chemical industry could appear to be somewhat unsympathetic about the misusers of their products, they were communicative, accountable and responded constructively to prevent further accidents.

Chemicals should be social history

The ordinary facts that chemicals were used in the home, either for pleasure or duty, makes them eligible for inclusion in the study and telling of social history. This thesis has shown that histories of chemicals are not only histories of chemistry, or

¹² <http://www.whatsinsidescjohnson.com/gb/en> (accessed 07 June 2016).

confined to describing the fortunes of chemical industries. Much richer histories of chemicals can be written when their varied uses and misuses are considered. Museums that seek to be relevant, or that want to highlight areas of their collection suitable for science and technology curriculum subjects could use domestic chemicals to achieve this. The case studies showed that chemicals do not only have to appear as powders in glass jars or liquids in bottles but could be represented through kitchen storage containers, darkroom outfits, garden tools as well as branded packaging. Although the discovery and invention of chemicals, and the development of chemistry as a science are important and interesting narratives to tell, the everyday uses and users of chemicals are also captivating because, for instance, they can link familiar current practices in daily life to the past and can add deeper understanding of practices that were taken for granted. Chemicals do not have to be presented only as a science lesson, as earnest engagement with principles of chemistry or with the tenets of environmentalism.

Museums tell stories about social changes, and domestic chemical use characterises some of these changes. For instance, in the 1930s, people who bought ready-made products considered themselves to be modern, not old-fashioned; then, as circumstances changed, buying ready-made became framed as extravagant or even damaging to their health or the environment. Users who chose soda in the 1980s were environment and budget conscious. Taking the example of home processors adds another dimension to the story told by seeing a range of cameras on display, as the National Media Museum does, because it reminds visitors that photographers could choose to process their own images. In the garden, herbicide users valued their time, for instance, Weedol users had more time to spend with their families because they were not tired out from weeding, whereas non-users might have claimed to tolerate weeds in order to accommodate wildlife.

Chemicals can illustrate social changes, as described above, because they are also associated with material cultures. The durable objects, the domestic technologies that are displayed in museums such as kitchen sinks, washing machines, watering cans, garden sprayers, cameras and flash powder holders, all represent cultures of domestic work, of convenience and leisure but they were also used with chemicals. The fashionable garments and furnishings exhibited under sterile conditions today were dirtied and cleaned by the people who lived with them. Chemicals are part of their

stories. To ignore them is to overlook and diminish certain aspects of people's lives. To include them enriches the picture of the past, not only by their presence adding to the total visual effect but because their presence represents a greater variety of users in the narrative, especially women and children. Chemical users do not have to be polarised into being either villains or victims. They were mischievous, idealistically motivated, inventive and resourceful. Chemicals can be used as one of the many keys to unlock stories about people and events. Chemicals represent social changes, advancements in all areas of knowledge, and shifts in attitudes about the world, and museums are an excellent place to explore these ideas.

Chemicals and lifestyle

Chemicals used at home were firmly part of a lifestyle, one in which labour-saving products were appreciated, but not only for their easing of efforts. Chemicals were a way in which differences and identities could be established, for instance, the photographer who processed their own photographs was more serious than those who sent them away, and those home processors who made up their own solutions from scratch were more committed than those who used convenient prepared mixtures. Weedkillers were used by gardeners who wanted neat, orderly spaces, but these chemicals were rejected by gardeners who identified themselves as eco-conscious, interested in organic methods or wildlife. Although this research showed that some chemical users thought about chemicals as old fashioned relative to modern, branded products,¹³ a perhaps surprising conclusion of this thesis has been that product use has not been consistently aligned with ideas of modernity, that is to say with speed, efficiency and rationality. This finding is based principally on the analysis of advertising, which has been shown to strongly influence what viewers said about choosing and using products. Manufacturers of photographic chemicals relied on descriptions of efficiency and accuracy, and even used images of scientists to promote their scientific prowess, whereas chemicals used for cleaning in the home, or weeding the garden did not. Adverts for garden chemicals have often looked to the past to situate the product in tradition. This has not been to simply compare an activity before and after the

¹³ "A16 Clothes Washing – Motives and Methods." Mass Observation, 1939.

availability of a chemical product, or to refer to improved standards of living as a result of the contributions of the chemical industry, although ICI used both of these strategies.¹⁴ Most often though, branded chemical products have been portrayed as convenient and labour-saving. Less complex chemicals, such as washing soda, were barely advertised at all, because their common availability was well established, known and taken for granted.

While the number of chemical products available has clearly increased, older chemicals have not necessarily been made redundant in a relentless progression, seen by the longevity of the appeal and utility of both washing soda and sodium chlorate. The appeal and availability of the weedkiller remained relatively constant, whereas washing soda disappeared, which coincided with supply issues and greater appeal of novel products, then reappeared. This reappearance has been described by Edgerton where an “old” technology was reintroduced to address a modern problem.¹⁵ Housewives and gardeners tended to look to the future, disengaging with individual chemicals in favour of branded products, at least until they encountered problems which they associated with the use of modern chemicals. Only then did housewives and gardeners return to older, simpler chemicals, such as sodas. In contrast, one of the appeals of processing photographs, whether the entire sequence from negatives to prints or prints only, was that home processors could connect with the past. Using chemicals had previously defined what it meant to be a photographer, and photographers had the option to recreate historic methods or to use the newest, most modern and improved products.

Successful and reasonably safe chemical use hinged on making the right choice of chemical or product for the situation. When tasks such as weeding or cleaning could be done without chemicals, adding chemicals simultaneously reduced physical labour, but also required skills. Understanding which chemical, or indeed which product, to select and how best to apply it, transformed a menial task into one for an expert. However, neither the users themselves nor manufacturers or messages conveyed by adverts

¹⁴ "ICI Research, the Springboard of Progress," *TT* 01 July 1963, 9; "Weedol: Two Ways to Weed," *DM*, 08 April 1971, 5.

¹⁵ David Edgerton, *The Shock of the Old: Technology and Global History since 1900* (Oxford: Oxford University Press, 2007) 49-51.

strongly expressed this view. In fact, users tended not to say much about their choices and uses of chemicals at all.

Moving forward

Users appeared to find recalling and considering past chemical use very difficult. For the benefit of future researchers interested in this topic, individuals could be encouraged to audit or reflect on their current domestic chemical use, because focussing on the present is less challenging. Mass-Observation accepts suggestions for directives, but other methods could also be used to gather responses.

This thesis has considered the use of chemicals in the home and to some extent their regulation, but retail, as the main, but not the only way, that chemicals enter the home, is a complementary topic that deserves deeper exploration, especially in light of changing regulations, attitudes and practices.¹⁶ International comparison of how and which chemicals are used or misused, the place of international trade and multinational companies, what products and knowledge migrants take with them or lose, would illuminate changes across geography and over time. Studying domestically used chemicals is a rich, engaging and rewarding topic, and there is vast scope for future research.

¹⁶ John Benson and Laura Ugolini, *A Nation of Shopkeepers: Five Centuries of British Retailing* (London: I.B. Tauris, 2003); Rachel Bowlby, *Carried Away: The Invention of Modern Shopping* (New York: Columbia University Press, 2001); Jon Stobart, "A History of Shopping: The Missing Link between Retail and Consumer Revolutions," *Journal of Historical Research in Marketing* 2 (2010): 342-349.

Bibliography

The Walgreens Boots Alliance Archive, Nottingham

Letter from Davies, P. "Thawpit, ICI." 1964.

Letter from Perry, F.C. "Thawpit, ICI." 1967.

Home & Garden. "Special Announcement: Sodium Chlorate." news release, 18 May 1970.

"Household Products Survey: Trends in and the Future for Household Cleaning Products" 1968.

History of Advertising Trust, Raveningham

HAT 50/1/175

Sub-series description in Admin History.

HAT 50/1/175/1

Advance material for Thawpit Review Board 31 December 1951.

Market Research Report 1950.

HAT 50/1/175/2

Holdsworth, G.A. Memo. 19 March 1935.

Mackendrick, M.E. Letter. 10 March 1942.

Market Research report 03 May 1951.

Parker, A.W. Notes on report. 11 May 1951.

Questions on Thawpit, 18 September 1941.

HAT 50/1/175/3

British Market Research Bureau. "Thawpit Consumer Investigation, 1945."

McCall Corporation. "The Home Market for Fabric Tints and Dyes, Spot Cleaners, Rug and Upholstery Cleaners." 1951.

The National Archives, Kew

HO 45/112240

Price, TH. "Colouring of Liquid Arsenical Weedkillers." 1922.

HO 144/23246

Bosanquet, A.R. "Chems. Letter to Explosives Dept from Chief Constable, Reading Borough Police." 1943.

Bosanquet, A.R. (Major). "Report on the Control of Certain Substances Which Might Be Used for Sabotage Purposes, During the War." 1945.

"Extract from Minutes of Special Branch Conference (Regional) Held at Reading on 29 April 1943."

Gonne St Clair Pilcher letter to Dr Watts. 19 March 1941.

"Precautions against Sabotage." 1939.

"Retail Sale of Certain Substances, Appendix A." 1941.

"Retail Sale of Certain Substances." 1942.

HO305/32 Control of Paraquat

Swan, A. A. B. "Letter to F. Stewart." 13 May 1968

Holloway, G. R. "Letter to F. Stewart: Paraquat." 12 March 1968

Holloway, G. R. "Letter to Bates." 25 October 1968

Stewart, P. "Letter to Holloway 'Paraquat'." 30 April 1969.

Morpeth, D. H. "Paraquat." 11 October 1972.

Wrigley, D.A. "Memo." 18 October 1972.

Kendall, R. "Poisons Board: Paraquat." 07 February 1973.

Extract from minutes of 66th Meeting of the Poisons Board, 23 February 1973.

Kendall, R. "Letter to J. Harrison." 27 March 1973.

Easton, P.H. "Regulations on the Sale of Paraquat."

Kendall, R. "Letter to G.R. Waters." 22 January 1974.

City of Liverpool Coroners' Depositions, 12 July 1968.

Staples, Gordon. "Letter to Mr Onslow, 1971."

MAF 284/289

Bates, J.A.R. "First Report on 'Weedol' Garden Herbicide." 1961.

"Third Report on Paraquat 'Weedol' for Amateur Use." March 1964.

MAF 284/307

Bureau of Commercial Research Ltd., "Report of a Placement Test for Weedol Weedkiller October 1964."

"Extracts from Minutes: Advisory Committee on Poisonous Substances Used in Agriculture and Food Storage." 20 March 1962.

"Fifth report on paraquat - Home Garden Use."

Goulding, Roy. "Letter to J.A.R. Bates: Paraquat." 16 August 1967.

Labrum, E.J. "Letter to R.D. Wiseman (PPL) ." 02 August 1965.

"Medical Record of Weedol Use."

Moore, P.N.M. "Telephone conversation with Holloway, 26 June 1968."

Moore, P.N.M. "SW1169 26 July 1968 Brief Note on the Present Position with Paraquat."

N.W. and H.E.V. "Weedol Data Sheet, 3rd Notification." 12 March 1964.

"Paraquat and Diquat Liquid Formulations: Summary of Experience of Human Exposure December 1965 - May 1967." 14 June 1967.

Plant Protection Limited. "SC1174: Gramoxone Data Sheet." 1962.

Rabington C.E. "Letter to J. Rowe." 09 November 68.

Scientific Subcommittee on Poisonous Substances used in Agriculture and Food Storage, "First Report on Paraquat", 23 March 1962.

Scientific Subcommittee on Poisonous Substances used in Agriculture and Food Storage, "Extract from Meeting 09 September 1969."

Swan A.A.B. "Letter to F. Stuart." 16 February 1968.

"Weedol Co-operator Trials." 1965.

JF 1/6 Toxicity, Solvent Sniffing

Chasle, M.A. "26 May 1971, Letter to Miss Henderson."

Ball, Diana "08 March 1973, Letter from Leeds Drug Liaison Committee to A.C. Burden, Home Office."

Blackburn, J. "17 February 1973, St Luke's Hospital, Letter to J.H. Howard."

East, John F. "Drugs Misuse Services: Report on "Sniffing" (the Inhalation of Chemical Substances for Pleasure) in the Portsmouth Area."

Pleydell, M.J. "20 February 1973, Letter from Oxfordshire County Council Health Dept to J.H. Howard, Home Office."

"Summary of Information from Drug Liaison Committees on Solvent Sniffing." 1971.

The Keep, Brighton

"A16 Clothes Washing - Motives and Methods." 1939. Mass Observation. SxMOA1/1/4/4/1.

"Liquid Scourer Survey." 1960. Mass Observation. SxMOA1/2/78/5/A/1.

Registers of Poison Vendors, C/C 25/20 - C/C 25/23.

Lambert. COR/3/2/1938/54. 1938.

Pocock, David. "Mass-Observation Autumn Directive." 1983. SxMOA2/1/13/1/3.

Autumn 1983 Directive: Housework & maintenance. Notebook-299. SxMOA2/1/13/1/3.

Autumn 1983 Directive: Housework & maintenance, J293. SxMOA2/1/13/1/3.

Other Collections

BF 1/1/199 66/1866, BF 1/1/299 67/10534, Institute of Education Archives, London.

Fitzhugh and Carr, "DD687/81 Sales Ledger." Nottingham Local Archive, n.d.

Hayes, Jean. "Housekeeping Accounts Book." 1977, Add MS 88958/5/13, British Library.

J.T. Chapman. 1938, MSI, with box 1988.146.3-6 & 45.

Kodak Amateur Flash Powder (1990-5036/6623), The Kodak Collection at the National Media Museum, Bradford. Collectionsonline.NMSI.ac.uk.

Iford Phenidone: A Remarkable New Developing Agent. 1953. MSI, Ilford Trade Lit.

National Wholesale Grocers' Association. "Why Chain Stores Threaten the Nation's Welfare, 1930." In *Major Problems in American Business History*, ed. Regina Lee Blaszczyk and Philip B. Scranton (Boston: Houghton Mifflin Company, 2006), 314.

No. 8 Salesmanship, The Ilford and Selo Course of Photographic Salesmanship and Service. London: Ilford Limited, no date. MSI, Ilford Trade Lit.

Ponting, Herbert. "Letter from Ponting to Burroughs Wellcome & Company, October 1911." Wellcome Foundation Archive, 1911.

"Proposed processes" DIC/BM 20/150/31 1903-1907 ICI; Archives of Brunner, Mond and Company Ltd and its subsidiaries, Cheshire and Chester Archives and Local Study Services.

Undated leaflet, courtesy of RoSPA Information Services, "Dangers at Home." London: RoSPA

Personal testimonies, personal communication

Anderson, Stuart. C816 *Oral history of community pharmacy*, British Library.

Bailey, D.M. *Children of Bethnal Green*. Stroud: History Press, 2013.

Boase, Tessa. *The Housekeeper's Tale*. London: Aurum Press, 2015.

Butcher, Dave. "Ilford and Photographic Chemicals." Interview by Cat Rushmore (23 September 2015).

Butler, Joyce. "NLSC: Fawcett Collection." Interview by Marie Maynard, British Library (1991).

Carter, Paul. "Oral History of British Photography." Interview by Shirley Read (2006).

Carter, Paul. "Using Photographic Chemicals." Interview by Cat Rushmore (31 July 2015).

Chat, Elisabeth. "Oral History of British Photography." Interview by Alan Dein (1994).

Cran, Marion. *Gardens of Character*. London: Herbert Jenkins, 1939.

Dominic, Zoe. "Oral History of British Photography." Interview by Shirley Read (1996).

Holmes, Caroline. *New Shoots Old Tips*. London: Frances Lincoln, 2004.

- Horsfield, Margaret. *Biting the Dust: The Joys of Housework*. Basingstoke: Palgrave Macmillan, 1999.
- Kelly, Anthony. "An Oral History of British Science." Interview by Thomas Lean (29 July 2011).
- Land, Frank. "An Oral History of British Science." Interview by Thomas Lean (21 June 2010).
- Last, Nella. (ed. Malcomson, Patricia and Robert Malcomson) *Nella Last's Peace: The Post-War Diaries of Housewife*, 49. London: Profile Books, 2008.
- Pilsbury, Joan. "National Life Stories Collection: Craft Lives." Interview by Frances Cornford (01-02 November 2012).
- PU80. Personal communication, discussion, 30 July 2015.
- Meara, P. Personal communication, email 28 November 2014.
- Miles, Constance. (ed. S.V. Partington) *Mrs Miles' Diary: The Wartime Journal of a Housewife on the Home Front*. London: Simon & Schuster, 2013.
- Morris, Dennis. "Staying Power Black Photographers Project." Interview by H.J, <http://www.vam.ac.uk/content/articles/s/staying-power-dennis-morris/> (accessed 01 November 2015).
- Morris, Mary. (ed. Carol Acton) *A Very Private Diary*, London: Weidenfeld & Nicolson, 2015.
- Morris, Peter. Personal communication, email 20 January 2016.
- Morris, Peter. Personal communication, email 27 September 2016.
- Morris, Peter. Personal communication, email 20 July 2016.
- Muir, Frank. *A Kentish Lad: The Autobiography of Frank Muir*. London: Corgi Books, 1998.
- Nathan Hill, Amelia. *Against the Unsuspected Enemy*. Bognor Regis: New Horizons, 1980.
- O'Neill, G. *My East End: Memories of Life in Cockney London*. London: Penguin, 2000.
- Robertson, Grace. "Oral History of British Photography." Interview by Alan Dein (27 September 1993 and 04 October 1993).
- Rowland, M. Personal communication, email 27 November 2014.
- Spence, Jo. *Putting Myself in the Picture: A Political, Personal, and Photographic Autobiography*. London: Camden Press, 1986.
- Strange, Joan. (ed. Chris McCooey) *Despatches from the Home Front: The War Diaries of Joan Strange 1939-1945*. Eastbourne: Monarch, 1989.
- Strasser, Charles. *From Refugee to OBE*. Milton Keynes: AuthorHouse, 2012.

Websites, electronic resources and reports

http://www.andrewbrons.eu/index.php?option=com_k2&view=item&id=27:sodium-chlorate-misuse-by-a-minority-hurts-the-majority (accessed 20 August 2016).

“Bomb disposal team destroys World War II extinguisher in Longniddry.”
<http://www.bbc.co.uk/news/uk-scotland-edinburgh-east-fife-22775253> (accessed 03 March 2014).

<http://collectionsonline.nmsi.ac.uk/> (accessed 21 September 2016).

“Coroners' Inquest Records.” <http://blog.nationalarchives.gov.uk/blog/coroners-inquest-records/> (accessed 03 March 2016).

http://www.heraldscotland.com/opinion/14281199.Not_just_a_flash_in_the_pan/ (accessed 20 September 2016).

<http://www.imdb.com/name/nm0628216/> (accessed 20 September 2016).

<http://photography.tutsplus.com/articles/a-brief-history-of-photographic-flash--photo-4249> (accessed 02 October 2015).

http://www.photomemorabilia.co.uk/Johnsons_of_Hendon/JoH_YearBook.html (accessed 14 October 2015).

<http://www.whatsinsidescjohnson.com/gb/en> (accessed 07 June 2016).

<http://www.sheffieldforum.co.uk/showthread.php?t=605870> (accessed 11 August 2016).

Explosives (Age of Purchase &C) Act 1976. London: Her Majesty's Stationary Office, 1976. <http://www.legislation.gov.uk/ukpga/1976/26/section/1>

Farm and Garden Chemicals Act 1967. London: Her Majesty's Stationary Office, 1967. http://www.legislation.gov.uk/ukpga/1967/50/pdfs/ukpga_19670050_en.pdf

Health and Executive Safety, 1998 “Storage and Use of Sodium Chlorate and Other Similar Strong Oxidants”. http://qub.ac.uk/safety-reps/sr_webpages/safety_downloads/sod_chlorate.pdf (accessed 04 May 2017).

“Report of Her Majesty's Inspectors of Explosives for the Year Ended 31st December 1970.” London: Home Office, 1971. (personal collection).

“Report of the Poisons Board in Regard to the Poisons List and Draft Poisons Rules Prepared in Accordance with the Pharmacy and Poisons Act, 1933.” London: Home Office, 1935.

TNS BMRB. “Public Attitudes to Chemistry.” Royal Society of Chemistry, 2015. <http://www.rsc.org/campaigning-outreach/campaigning/public-attitudes-chemistry> (accessed 29 September 2016).

“Commission Decision Concerning the Non-Inclusion of Chlorate in Annex I to Council Directive 91/414/EEC and the Withdrawal of Authorisations for Plant Protection Products Containing That Substance.” *Official Journal of the European Union* (18 November 2008).

Smith, Mark G. “Preliminary Study of Sources of Carbon Tetrachloride Final Report.”

233: GCA Corporation GCA / Technology Division, 1983. <http://bit.ly/2pIBOd6>
Toxicology Department. "Carbon Tetrachloride - General Information." Public Health England, 2009. <http://bit.ly/2qDVfBO>

Periodicals

- "A Wonderful Weed-Killer." *National Allotments Journal*, no. 22 (1934): 17-19.
- "A Wonderful Weed-Killer (Continued)." *National Allotments Journal*, no. 23 (1935): 19-21.
- "Abol." *Amateur Gardening*, 23 June 1934.
- Allan, A.R., R C. Blackmore, and P.A. Toseland. "A Chloroform Inhalation Fatality - an Unusual Asphyxiation." *Medicine, Science and the Law*, 28 (1988): 120-122.
- "An Anaesthetic Shampoo." *BMJ* 2 (1907): 764-765.
- "An Antirrhinum Menace." *MG*, 21 March 1936.
- "An Anti-Smog Bottle." *BMJ* 2 (1955): 1135.
- "An Oil Remover." *MG*, 16 October 1930.
- "Angry Husband 'Poisoned His Wife's Cereal'." *DM*, 16 October 1985.
- "Answers to Correspondents: Old Flash powder." *APC*, 07 February 1931.
- "Any Questions?" *BMJ* 1 (23 April 1949): 734-736.
- "April in the garden with ICI." *PG*, April 1971.
- Archbald, J.E. "Flashlight for Fun." *Kodak Magazine*, December 1929.
- "Article on Home Processing for Beginners." *AP*, 08 November 1980.
- "Aspirins Are the Biggest Killer of Under 5's." *DM*, 24 April 1966.
- Astor, Nancy. "Evacuation." *HC Deb Hansard* (14 September 1939): vol 351, cc802-86.
- "At Home or Away Boots Helps You Save" *Hartlepool Mail*, 14 August 1953.
- "Atlacide." *TT*, 21 September 1944.
- "Attractive Allotments and the National Scheme." *National Allotments Journal*, no. 21 (1934): 10-12.
- "Autumn and the Furniture." *MG*, 18 November 1926.
- Ball, Philip. "All Set for Chemistry." *Chemistry World*, 15 May 2015.
- "Beaucaire - This Bottle Saves Dozens of Coupons." *Lincolnshire Echo*, 16 December 1942.
- "Bedroom as Darkroom." *AP*, 18 October 1961.
- Beney, Harry J. "A Vanishing Species: The Gentleman's Gentleman." October 1953.
- Bettley, F. Ray. "Hand Eczema." *BMJ* 2 (1964): 151-155.

Boseley, Sarah. "Blackmailers Spiked Baby Food." *TG*, 27 April 1989.

"Bomb-Making Outbreak." *TT*, 19 March 1962.

Bourne, L.B. "Prevention of Industrial Dermatitis." *BMJ* 2 (1944): 512-12.

"Boy and Girl in lung-swop operation." *DM*, 13 May 1968.

"Boy Injured in Explosion." *Dundee Evening Telegraph*, 30 September 1927.

"Boy Soldier Was 'Doomed to Die'." *MG*, 09 November 1954.

"Boys Get Killer Bomb Warning." *DM*, 07 April 1960.

Brown, Lynda. "Victims of the Century." *TG*, 15 May 1987.

Brown, Paul. "Chemicals in Water Linked to Harwell." *TG*, 23 March 1990.

Bullen, Peter. "Weedkiller Warning." *DM*, 25 May 1968.

Butler, Joyce, Peter Mills, Robert Cooke, David Mudd, and Anthony Stodart. "Farm and Garden Chemicals." HC Deb *Hansard* (20 June 1971): vol 821, cc1295-407.

Calnan, M. "Accidental Child Poisoning and Health Education." *British Journal of Preventive & Social Medicine* 28 (1974): 67.

Camera Girl, "Develop Your Own Films." *Falkirk Herald*, 28 August 1937.

"Carbon Tetrachloride Poisoning" *BMJ* 1, (1934): 953-954.

"Carbosil." *The Sunderland Echo and Shipping Gazette*, 23 March 1932.

"Carbosil." *The Sunderland Echo and Shipping Gazette*, 31 May 1933.

"Child died from weed killer," *TT*, 14 August 1968.

"'Chloroform' Cleaner Kills Girl of Six." *DM*, 02 July 1947.

"Cleaning Enamel and Aluminium." *MG*, 01 August 1924.

Colling, Keith. "Wife 'Gave Husband Poison to Teach Him a Lesson'." *DM*, 20 March 1974.

"Confused Bottles." *Derby Daily Telegraph*, 14 September 1938.

"Coroners and the Public Interest." *BMJ* 3 (1974): 374.

"Corporate Profile: Warren H. Moyer." *Journal of Agricultural and Food Chemistry* 3 (1955): 362-363.

"Common Remedy Condemned" *TT*, 25 January 1928.

"Cooking Economies." *MG*, 02 November 1939.

Craft, A.W., and D.M.B Hall. "Munchausen Syndrome by Proxy and Sudden Infant Death." *BMJ* 328 (29 May 2004): 1309-1312.

Craig, J. O. "Emergencies in General Practice: Poisons Children Swallow." *BMJ* 2 (1955): 1496-1498.

Crosthwaite-Eyre, Oliver and Thomas Williams. "Sodium Chlorate," HC Deb *Hansard* (19 November 1945): vol 416, cc25-6.

"Dandelions." *MG*, 01 July 1936.

Dalyell, Tam. "Forum: Westminster Scene." *New Scientist*, 01 April 1971.

Darby, Charles. "How Paradise Found It's View Again." *DM*, 07 May 1966.

"Deadly Duster Kills a Girl." *The Daily Express*, 15 May 1958.

"Deeweed", *DM*, 04 July 1981.

Dempsey, James. "Home Safety," HC Deb *Hansard* (19 November 1964): vol 702 cc598-9

"Dim Outlook." *Dundee Evening Telegraph*, 31 July 1947.

Display advertising, *DM*, 27 April 1940.

Dixon, W.E. "Preservatives In Food." *TT*, 14 February 1925.

"Don't waste time with weeds." *TT*, *DM*, *Daily Mirror* and *Express*, 1965.

Dresner, Simon. "The Detergent Mess... What to Tell Your Wife." *Popular Science*, January 1972.

du Botton, Roger. "Doomwatch Checks Chemical Safety." *PG*, April 1971.

Duckham, Alexander. "Removing Stumps of Oaks." *TT*, 28 July 1930.

"Economies in the Kitchen." *MG*, 24 July 1940.

Ede, James. "Education (School Attendance) Bill." HC Deb *Hansard* (06 November 1930): vol 244 cc1089-207.

"Editorial." *Kodak Special*, Spring 1959.

"Efficient Housekeeping" *TT*, 03 November 1940.

Erlichman, James. "ICI Admits Green Labels Were Wrong." *TG*, 07 June 1990.

Erlichman, James. "Two Green Fingers: Brandwagon." *TG*, 05 January 1990.

"Exploded Flash Powder." *Dundee Evening Telegraph*, 27 December 1939.

"Explosives Security." HL Deb *Hansard* (06 November 1975): vol 365, cc1377-9.

Fallows, George. "I Let the Gas Man Dope Me." *The Daily Mirror*, 18 November 1960.

"Fast and easy." *DM*, 16 April 1977.

"Farm and Garden Chemicals." HC Deb *Hansard* (20 July 1971): vol 821 cc1395-407.

"Farming Notes and Comments." *TT*, 19 January 1931.

"Feedback: MP Calls for British Fluorocarbon Ban." *New Scientist*, 07 August 1975.

"Fight for Sugar-Bomb Boy's Life." *DM*, 19 March 1962.

Fisher, Nigel and George Thomas. "Written Answers: Cleaning Fluids." *Hansard* (26 April 1965): vol 711 cc20-1W.

"For Poison Bottles." *Hastings and St Leonards Observer*, 22 March 1924.

Forrester, John, Sally Oppenheim, John Fraser, and Neil Thorne. "Dangerous Household Products (Child Safety) Packaging Bill." HC Deb *Hansard* (29 January 1982): vol 16, cc1157-67.

"Four Heads on One Girl" *DM*, 05 December 1964, 7.

Fry, Peter. "Aerosols." HC Debate *Hansard* (20 December 1988): vol 144, cc419-26.

"Garden Notes." *TT*, 09 July 1932.

"Garden Poisoner Injures Baby." *DM*, 01 July 1958.

"Gardening &C." *TT*, 24 March 1939.

Gaskell, Jane. "The Boy Who Thought He'd Had a Drink of Pop." *DM*, 24 June 1971.

Gelson, Hilary. "Cool Calm and Collected." *TT*, 09 July 1970.

"Gift Guide Editorial." *AP*, 06 December 1961.

"Gift Guide Editorial." *AP*, 22 November 1980.

Gilbert, Stephanie. "Developing Your Films." *Spare Rib* no. 26 (1974): 30-31.

"Girl drinks first and dies." *DM*, 30 September 1972.

"'Glitter' Chemical Banned." *TG (1959-2003)*, 14 August 1979.

Glasspoole, Claire. "25 Labour Saving Ideas." *PG*, November 1966.

"ICI Action against Hunger." *TT*, 19 August 1974.

"ICI Gramoxone." *TT*, 07 December 1964.

"ICI Research, the Springboard of Progress." *TT*, 01 July 1963.

Hamilton, Geoff. "Comment." *PG*, January 1981.

Handyman Which?, February 1973, 10.

Harris, E. "Chilblain Treatment." *Derby Daily Telegraph*, 19 January 1950.

Hawkes, Nigel and Jane Edgington. "Ban This Poison." *The Observer*, 25 March 1973.

Hay, Roy. "Take the Backbreak out of Weeding." *TT*, 17 June 1967.

Hay, Roy. "Say It with Fertilisers." *TT*, 08 December 1973.

Hay, Roy. "Covering a Lot of Ground." *TT*, 15 June 1974.

Hayhoe, Francis. "The Opposite View." *PG*, July 1980.

Hayman, Rex. "Any Amateur Can Make Prints." *TG*, 21 November 1975.

"Health and the Household." *Taunton Courier and Western Advertiser*, 05 November 1938.

Helliwell, Author M., and J. Nunn. "Mortality in Sodium Chlorate Poisoning." *BMJ* 1 (1979): 37-38.

"Helpful Hints Series." *Kodak Magazine*, March 1930.

Henderson, C.J. "How to Keep Your Hands Dry When Making Enlargements." *APC*, 07 September 1938.

Hooson, Emlyn. "Home made explosives (accidents)" HC Deb *Hansard* (28 June 1966): vol 730, cc250-1W.

Hooson, Emlyn and Alice Bacon. "Sodium Chlorate." HC Deb *Hansard* (18 May 1966): vol 728, cc266-7W.

"How to carry on in 1942." *AP*, 31 December 1941.

Howard, Philip. "Camping as Life of Luxury with Inflatable Furniture and Ingenious Gadgets." *TT*, 27 January 1972.

Howell, David, James Kilfedder, Evelyn King, John Maginnis, Stanley McMaster, Eric Ogden, Enoch Powell and Merlyn Rees. "Northern Ireland (Control of Explosives)." *HC Deb Hansard* (05 June 1972): vol 838, cc156-72.

Hughes, J.P.W. "Toxicity of Carbon Tetrachloride." *BMJ* 3 (1969): 360.

"ICI Action against Hunger." *TT*, 19 August 1974.

"ICI Gramoxone." *TT*, 07 December 1964.

"ICI Research, the Springboard of Progress." *TT*, 01 July 1963.

"'I'll Pole-Axe You' a Mother's Shout at Murder Case." *DM*, 05 July 1974.

"Imperial Chemical Industries [washing soda]." *TT*, 17 October 1940.

"Imperial Chemical Industries Limited [stop the rot]." *TT*, 27 June 1941.

"In Brief." *Gloucester Citizen*, 13 April 1948.

"In Britain Too." *Western Morning News*, 14 January 1948.

"Infested New Houses." *MG*, 12 December 1933.

"Information On Poisons." *BMJ* 1 (1963): 1220.

"Iodine Stains." *MG*, 10 July 1933.

Jackson, Harold "Police in Derry Use Tear Gas and Armour." *TG*, 13 August 1969.

Jackson, R. H., J.H. Walker, and N.A. Wynne. "Circumstances of Accidental Poisoning in Childhood." *BMJ* 4 (26 October 1968): 245-248.

Jackson, R.H, and A.W. Wilkinson. "Why Don't We Prevent Childhood Accidents?". *BMJ* 1 (1976): 1258-1262.

"'Jews Keep out' Sign on Links." *Daily Express*, 11 July 1938.

"Johnson & Son Cash Prizes for Indoor Snaps." *AP and Cinematographer*, 14 January 1931.

"Johnson & Sons Manufacturing Chemist." *AP*, 11 October 1944.

"Johnsons of Hendon Ltd." *British Photographic Almanac*, 1946.

"Johnsons of Hendon Ltd." *The British Journal Photographic Almanac*, 1949.

Kent, Cassandra, and Gillian Smedley. "Out, Damned Spot! GHI's Guide to Stain Removal.", *Good Housekeeping Magazine*, September 1975, 74-79.

Kessel, Neil. "Self-Poisoning: Part I." *BMJ* 2 (27 November 1965): 1265-1270.

Kessel, Neil. "Self-Poisoning: Part II." *BMJ* 2 (04 December 1965): 1336-1340.

Knight, Author R. K., J. R. Trounce, and J. S. Cameron. "Suicidal Chlorate Poisoning Treated with Peritoneal Dialysis." *BMJ* 3 (1967): 601-602.

"Killer chemical goes on Poisons List." *DM*, 09 September 1968.

"Kodatone" *The "Kodak" Magazine*, April 1929.

"Killing Weeds at 28 M.P.H." *TT*, 16 August 1937.

"Lakes May Recover Quickly from Pollution." *TG*, 06 September 1976.

Lambert, George and Belcher, John. "Sodium Chlorate Supplies." *HC Deb Hansard* (05 July 1948): vol 453, cc11-2W.

Lewis, James. "Sud Standard." *TG*, 16 June 1973.

"Looking Ahead." *PG*, December 1963.

"Love Bites Made Me a Poisoner." *Daily Mirror*, 03 July 1974.

Love, E. and A. Miller. "Fatal Poisoning by Inhalation of Carbon Tetrachloride (Thawpit)." *The Lancet* 257 (1951): 1306-1307.

Loveys, Walter and Christopher Woodhouse "Sodium Chlorate." *HC Deb Hansard* (07 February 1963): vol 671, cc644-5.

Low, Lia. "How Do You Clean?" *TG*, 17 March 1965.

Low, Lia. *Keep It Clean*. London: The Bodley Head, 1965.

"Lung Transplant in Edinburgh.", *Glasgow Herald*, 17 May 1968.

"Lung boy sits up for icecream." *DM*, 18 May 1968.

"Lung transplant boy dies." *DM*, 29 May 1968.

MacKenzie, Debora. "Substitute CFCs Will Stoke Global Warming." *New Scientist*, 13 May 1989, 25.

Mallalieu, Joseph and David Renton "Sodium chlorate." *HC Deb Hansard* (21 December 1961): vol 651, c178W.

Maney, C.E. "A.R.P. Shelter as Dark-Room." *AP*, 03 February 1941, 135.

"Mantlepiece Stains." *MG*, 08 November 1934.

Marsden, K.E. "This Cleaning Fluid Is Dangerous If Used Foolishly." *Care in the Home* (July 1975): 21.

Matthews, John. "Unions Press for Herbicide Ban." *New Scientist*, 21 February 1980, 558-.

"May in the Garden with ICI." *DM*, 02 May 1970.

Mcdonald, A.D. "Editorial: Work and Pregnancy." *British Journal of Industrial Medicine* 45 (1988): 577-580.

McKee, Victoria. "Up the Garden Path?" *TT*, 28 April 1988, 18.

McKendrick, T. "Poisoning Accidents in Childhood." *Archives of Disease in Childhood* 35 (1960): 127-133.

McQueen, Alastair. "Terror of the Teeny Glue Gangs." *The Daily Mirror*, 24 October 1979, 16-17.

Meadow, Roy. "ABC of Child Abuse: Poisoning." *BMJ* 298 (27 May 1989): 1445-1446.

Meadow, Roy. "Munchausen Syndrome by Proxy: The Hinterlands of Child Abuse." *The*

Lancet 2 (1977): 343-345.

Meadow, Roy. "Non-Accidental Salt Poisoning." *Archives of Disease in Childhood* 68 (1993): 448-452.

Men's Hairpieces," *Which?* Consumers' Association, October 1969.

Meredith, T.J., and J.A. Vale. "Treatment of Paraquat Poisoning in Man: Methods to Prevent Absorption." *Human Toxicology* 6 (1987): 49-55.

"Miscellany." *MG*, 26 February 1930.

Moir, Sigurd. "The Importance of Being Accurate." *APC*, 21 January 1931.

Moore, T. and Cripps S. "Steel (Export)." HC Deb *Hansard* (08 July 1946): vol 425, c11W.

"More Bomb Outrage Attempts." *The Coventry Herald*, 03 June 1939.

Mortimer, F.J. "Topics of the Week: Metol Poisoning." *APC*, 23 March 1938.

"Naval Officer's Suicide." *Hastings and St Leonard's Observer*, 13 June 1931.

"Nazi Salute" *DM*, 29 August 1962.

Neathercoat, E.T. "Poisons in the Home." *DM*, 02 January 1926, 6.

Neubert, Frank R. "Skin Disease from Photographic Colour Developers." *BMJ* 1 (1966): 542.

"New Lines." *TG*, 15 April 1963.

"News." *APC*, 21 September 1938.

Niesewand, Peter. "Hard and Last Rules." *TG*, 14 July 1981.

"Not Easily Obtainable." *AP*, 07 May 1941.

"Now paraquat must carry poison label." *DM*, 02 February 1974.

Nuttall, Nick. "ICI Accused of 'Green' Deception." *TT*, 07 June 1990.

Oppenheim, Sally and Gwilym Roberts. "Firework Accidents" HC Deb *Hansard* (31 October 1979): vol 972, cc538-9W.

"Out, Damned Spot! A Great Maid Tells the Secrets of Her Craft: Spots and Stains." *Vogue*, July 1967.

"Paraquat: Firm Urged to Act." *DM*, 31 October 1972.

"Paraquat's toll of 97 victims." *Daily Express*, 13 July 1974.

Pearn, J., J. Nixon, A. Ansford, and A. Corcoran. "Accidental Poisoning in Childhood: Five Year Urban Population Study with 15 Year Analysis of Fatality." *BMJ* 288 (1984): 44-46.

Peronat, Paul. "Glue Sniffing and Chemicals." *AP*, 28 July 1976.

"Pesticides and Posterity." *Horizon*, BBC Television, first aired 30 May 1964 (accessed British Film Institute).

"Photography for Girls." *Nottingham Evening Post*, 13 July 1936.

"Photography Need Not Be Costly." *APC*, 04 May 1938.

Pickering, Douglas, Martin Moncrieff, P.C. Etches, and John P. Osborne. "Non-Accidental

Poisoning and Child Abuse." *BMJ* 1 (1976): 1210-1211.

"Points from Letters" *TT*, 31 May 1937.

"Poison death: Firm rapped." *Daily Mirror*, 31 October 1972.

"Poison Husband's Grief." *DM*, 23 November 1977.

"Poison Warning Call." *DM*, 10 October 1972.

"Poison stew wife is jailed for life" *DM*, 10 January 1975.

"Poisons." *AP*, 18 June 1941, 529.

"Police Rule out Cricket Tour Vigilantes." *TT*, 07 May 1970.

Pope, William J. "Preservatives In Food" *TT*, 22 January 1925.

"Prize Flowers Poisoned." *DM*, 03 November 1947.

"Put Caustic Soda in Fish Tanks." *MG*, 27 November 1953.

"Question Box: Women are asking...." *Motherwell Times*, 27 February 1948.

Raffle, Andrew, John Gray, and Hector Macdonald. "First-Aid Treatment of Poisoning." *BMJ* 1 (1976): 93.

"Rape Torment of Poisoned Girl." *DM*, 05 May 1979.

"Razor Blades." *TT*, 10 May 1944.

"Readers' Questions Answered: Developer Poisoning." *APC*, 06 April 1938.

"Readers Questions Answered: Glycin Developer." *APC*, 29 June 1938.

"Ready-Weighed Developer." *APC*, 25 May 1938, 610.

Redford, Arthyr. "Bottle Said 'Lemonade' but It Killed Beverley." *DM*, 14 August 1968.

"Reducing the Effect of Poison Gases." *TT*, 07 January 1935.

Ridler, P. "Clearer Labels." *PG*, December 1966.

Roberts, Gwilym, Merlyn Rees and Walter Loveys. "Fireworks (Accidents)." *HC Deb Hansard* (13 February 1969): vol 777, cc1540-1.

Robinson, Kenneth. "Your Date with the Good Life." *TT*, 07 January 1988.

Rodgers, Peter. "Postponement Vital to Albright and Wilson." *TG*, 30 December 1970.

Rodwell, Robert. "Army Uncovers a Mrs Beeton for Bombers." *New Scientist*, 03 May 1973.

Rogers, David, John Tripp, Arnon Bentovim, Anthony Robinson, David Berry, and Roy Goulding. "Non-Accidental Poisoning: An Extended Syndrome of Child Abuse." *BMJ* 1 (03 April 1976): 793-96.

Rowland, Marcus L. "Chemical Threat from Cleaning." *AP*, 14 July 1976.

Rowland, Marcus L. "Dangers of Carbon Tetrachloride." *AP*, 11 August 1976.

Rudd, E. "Dosage Chart." *PG*, April 1964.

"Runaway Plan of Poison Pie Wife." *DM*, 05 November 1982.

Russell, Stan. "Laboratory Gardening." *PG*, April 1964.

Russell, Stan. "Why You Have Weeds." *PG*, September 1971.

Russell, Stan. "Garden Revolution!". *PG*, February 1975.

Russell, Stan. "Over the Fence." *PG*, February 1976.

Ryan, Fiona, Helen Witherow, Jack Mirza, and Peter Ayliffe. "The Oral Implications of Caustic Soda Ingestion in Children." *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology* 101 (2006): 29-34.

"Salt Shortage." *Nottingham Evening Post*, 16 October 1947.

"Saving Fuel." *MG*, 21 September 1939.

"Science and Housekeeping: Some Small Points." *MG*, 27 August 1935.

"Scorch Marks." *MG*, 22 February 1934.

Settle, Alison. "Women and the Raids." *The Observer*, 06 October 1940.

Sherman, Margaret. "Don't Cry over Spilt Ink." *DM*, 1950.

Sherwood, Martin. "ICI, Patents and Paraquat." *New Scientist*, 09 November 1972.

Sherwood, Martin. "Patently, a Lapse." *New Scientist*, 17 May 1973, 395.

"Shoes at the Seaside." *MG*, 07 August 1934.

"Should this killer be allowed?" *DM*, 30 August 1972.

"Smell Kills Boy Aged 6." *DM*, 20 October 1962.

Ian, Smith. "Son Takes Poison to Punish Father," *DM*, 08 June 1977.

Smith, Ivor. "Chemicals in Wartime." *AP*, 06 August 1941, 636.

Smith, L.L. "Mechanisms of Paraquat Toxicity in Lung and Its Relevance to Treatment." *Human Toxicology* 6 (1987): 31-36.

"Soda in the Kitchen." *Coventry Herald*, 11 September 1891.

"Soda." *Dover Express*, 10 February 1950.

"Sofnol Advertisement." *Amateur Gardening*, 09 June 1934.

"Spinster Killed Nosey Old Man – Police." *DM*, 03 April 1962.

"Spring Cleaning." *TT*, 06 April 1938.

"Spots and Stains." *MG*, 01 January 1926.

"Stain Removers." *Which?*, February 1964.

"Stockings." *MG*, 13 June 1935.

"Stocking A.R.P. Larder." *MG*, 14 July 1939.

"Strict controls imposed on paraquat weedkiller." *TT*, 02 February 1974.

"Summer Stains." *MG*, 22 May 1935.

Sykes, Eric W. "Overcoming Wartime Snags." *AP*, 18 June 1941.

"Taxman Who Lived in Fear of the Taxman." *DM*, 14 February 1979.

Taylor, J.C., C.L. Norman, J.M. Bland, J.D. Ramsey, and H.R. Anderson. "Trends in Deaths Associated with Abuse of Volatile Substances." (1998).
<http://news.tictac.org.uk/news/6.3/report13.pdf> accessed 20 March 2016

Teare, R.D. "Poisoning by Paraquat." *Medicine, Science and the Law* 16 (1976): 9-12.

"Ten Calls for Ambulance: Bolton's Bad Night." *MG*, 04 August 1937.

"Tent of Death." *TG*, 21 January 1984.

Thatcher, T. H. "Weed Killing on Railways." *TT*, 19 August 1937.

"Thawpit - You Can Clean Your Suits at Home." *Northern DM*, 24 July 1945.

"Thawpit - X Marks the Spot." *Northern DM*, 16 June 1946.

"Timothy Whites Super Summer." *Daily Express*, 17 May 1968.

"The Best Way to Keep Paths Free of Weeds." *DM*, 13 June 1959.

"The Boy Who Can't Be Saved." *DM*, 15 February 1971.

"The Dangers of the 'Dry Shampoo'." *TT*, 25 August 1909.

"The Garden in August." *MG*, 23 July 1938.

The Home-Lovers Encyclopedia. London: Amalgamated Press, 1933.

"The Killer Inside the Bottle." *DM*, 08 July 1972.

"The Manchester Assizes: A Lover's 'Brutal Revenge'." *MG*, 24 April 1940.

"The Poisonous Substances Bill." *The Lancet* 09 July (1898): 93-94.

"The Ministry of Food." *TT*, 06 November 1941.

"The Ministry of Food." *TT*, 04 April 1944.

"The Monster." *MG*, 02 November 1932.

"The Wrong Bottle." *Yorkshire Evening Post*, 06 September 1933.

"These Could Kill You." *DM*, 24 June 1971.

Tinker, Jon. "The Vapona Dossier." *New Scientist*, 02 March 1972, 489-492.

Tisdall, Patricia. "Gardening - Digging into Your Pocket." *TT*, 10 August 1976.

"Today's Drugs: Treatment of Acute Poisoning: 1." *BMJ* 2 (1964): 927-29.

"To get plenty of vegetables, I give them plenty of help." *Daily Express*, 04 November 1977.

"Tomlinson & Hayward Advertisement." *Amateur Gardening*, 05 May 1934.

Town-Jones, E. M. "Gardening Hazard." *BMJ* 1 (1957): 1532-32.

Turner, R.S. "Is Photography Expensive?" *AP*, 25 October 1961.

Turner, W. "Safer Weed-Killer Spraying." *PG*, October 1966.

"Two Technical Tips: Magnesium Ribbon." *Kodak Magazine*, January 1930.

"UK Resists Child-Resistant Packages for Pills." *New Scientist*, 25 April 1974.

"Vacuum Flasks." *MG*, 16 June 1932.

"Valmor High Fashion Wigs." *Ebony*, June 1973.

Veitch, Andrew. "'A Growing Number of Young People Are Totally Incapacitated Because of Pollution'." *TG*, 10 February 1982.

"Victims Tell of Struggle to Find a Career." *DM*, 21 August 1964.

"Waging War on Weeds," *Good Housekeeping*, July 1975.

Walsh, P.A. "Friend of the 'Friends'." *PG*, August 1980.

Walker, G. "Chemical Free Product." *PG*, June 1963.

"War Chemicals." *Amateur Photographer and Photographic News*, 05 November 1917.

"War on Weeds." *PG*, June 1963.

"Warning Needed." *TT*, 19 August 1964.

Warrack, A.J.N. "Another Domestic Hazard." *Medicine Science and the Law* 18 (1978): 93-95.

"Wartime Economies." *AP*, 03 December 1941.

"Washday Hints." *MG*, 30 June 1937.

"Weary Battle against the Weeds." *TT*, 21 March 1959.

Webb, T.C. Scott, and B.B. Harrison. "Gardening Hazard." *BMJ* 2 (1957): 104-104.

"Weed-Killer Wife Jailed for Life." *DM*, 21 July 1973.

"Weed-Killer Bomb Kills Boy." *DM*, 15 April 1961.

"Weedol." *TT*, 06 May 1995.

"Weeping Man Hides from Scarred Girl." *Daily Express*, 06 December 1962.

Weir, Ronald J. "Carbon Tetrachloride Poisoning as a Hazard of Wig Cleaning" *BMJ* 1 (1969): 487.

"Where's All the Soda?" *Daily Express*, 05 October 1949.

"Where to Go for Help." *Good Housekeeping Magazine*, May 1975.

"Winter Spraying: Fruit and Other Trees." *MG*, 30 November 1940.

W.L.F.W. "With the Beginners." *APC*, 03 June 1931, 495-96

Woodhead, Henry K. "Weeds on Lawns." *TT*, 10 September 1932.

Woodroffe, Ernest. "Unilever: Meeting the Demands for a Better Standard of Life." *TG*, 20 May 1973.

"Woolworths" *Daily Express*, 06 February 1959.

"Woman Burned by Acid." *MG*, 14 January 1949.

"Wrecker Poisons Golf Links." *DM*, 25 July 1960.

Wright, Pearce. "Controversy on Patent Rights of Weedkiller." *TT* 09

"You Have Better Things to Do Than Polish Silver." *Good Housekeeping*, February 1970.

"Your Latest Questions." *Good Housekeeping*, October 1955.

Manuals, leaflets, broadcasts

A "Practical Householder" Handbook. London: George Newnes, 1962.

Beale, Reginald. *The Book of the Lawn: A Complete Guide to the Making and Maintenance of Lawns and Greens for All Purposes*. London: Cassell, 1931.

Beeton, Isabella. *Mrs. Beeton's Hints to Housewives; with Sections on Labour-Saving, Household Work, Servants' Duties, Shopping, Table Service, Etiquette, and First Aid*. 1928.

Bowler, Stanley W. *Photography for Boys and Girls*. New York: T. Y. Crowell Co., 1952.

Brannt, William. *The Practical Dry Cleaner, Scourer and Garment Dyer*. 4th ed. Philadelphia: Henry Carey Baird & Co, 1911.

Chancellor, Richard. *Weed Control in the Garden*. London: Cassell, 1988.

Charteris, Leslie. *Trust the Saint* (London: Hodder and Stoughton, 1962).

Conran, Shirley. "Without a Stain on Her." *The Observer*, 21 June 1970.

Conran, Shirley. *Superwoman: Everywoman's Book of Household Management*. London: Sidgwick and Jackson, 1975.

C.W.S. *Household Hints*. Manchester: C.W.S. Publishing Company Limited, 1930s.

De Both, Jessie Marie. *Modern Household Encyclopedia*. Chicago: J.G. Ferguson and Associates, 1946.

Directory of Garden Chemicals. Third ed. London: British Agrochemicals Association, 1978.

Directory of Garden Chemicals. Ninth ed. London: British Agrochemicals Association 1984.

Dixon, Joan and Kathleen E. Fletcher, *Laundry Work* (London: Pitman, 1974).

Elliot, M., M. O'Cadhla, and Greenpeace. *Stepping Lightly on the Earth: A Guide for Clean Living*. Dublin: Greenpeace, 1993.

Frith, Simon J. "In Search of Our Throwaway History with Robert Opie." Throwaway Publications Ltd, DVD, 2013.

Good Housekeeping's Household Hints Compiled and Tested by Good Housekeeping Institute. London: National Magazine Company, 1950.

Gundrey, Elizabeth, and Jean Carper. *Stay Alive: How to Avoid Accidents in the Home*. London: MacGibbon & Kee, 1967.

Gundrey, Elizabeth and Philip Barty (eds) *'Reader's Digest' Household Manual*. London: Reader's Digest Association, 1977.

Hassall, Kenneth A., and A. V. Percival. *Weed Control in the Home Garden: A Simple*

- Guide*. West Byfleet: Percival, Best, Publications, 1973.
- Hatcher, Jo. *Home-Making on a Budget*. Wellingborough: Thornsons, 1977.
- Henry, Richard J. *Controls in Black and White Photography*. 2nd ed. Boston: Focal Press, 1986.
- Hills, Lawrence. *Pest Control without Poisons*. Henry Doubleday Research Association, 1964.
- How to Use the Johnson 'Do-It-Yourself' Outfit*. London: Johnsons of Hendon, c. 1957. (personal collection).
- Hutchin, Kenneth Charles. *How Not to Kill Your Husband*. London: George Allen & Unwin, 1962.
- Hutchin, Kenneth Charles. *How Not to Kill Your Wife*. London: George Allen & Unwin, 1965.
- Hutchin, Kenneth Charles. *How Not to Kill Your Children*. London: George Allen & Unwin, 1968.
- It's All in Knowing How*. New York: Church & Dwight, 1935.
- Ivens, G.W. and J. Stubbs. *Plant Protection in the Garden*. London: The British Crop Protection Council, 1990.
- Jacobson, C.I. *Developing: The Negative-Technique*. 2nd ed. London: The Focal Press, 1942.
- Jacobson, Kurt I. *Developing : The Negative Technique*. Manual of Photo-Technique. Ed R. E. Jacobson. 18th ed. London: Focal Press, 1976.
- Keating, Leslie. *Stain Removal*. Havant: Kenneth Mason, 1972.
- Kurrein, Carol. *The Flymo Book of Garden Games & Lawn Leisure*. Newton Abbott: David & Charles Publishers plc, 1989.
- Lilley, Geoffrey. *Make Your Own Darkroom for Colour Printing*. London: Fountain Press, 1962.
- Ling, Eva. *Modern Household Science*. London: Mills & Boon, 1975.
- Mackarness, Richard. *Chemical Victims*. London: Pan Books, 1980.
- Mannheim, Ladislaus Andrew. *Straightforward Developing: How to Get the Best out of Your Own Films*. London: Focal Press, 1949.
- Ministry of Agriculture, Fisheries, and Food. *Chemicals for the Gardener: For the Control of Plant Pests*. 1 ed. London: HMSO, 1963.
- Moore, Alma Chesnut. *How to Clean Everything: An Encyclopedia of What to Use and How to Use It*. London: T Werner Laurie Ltd, 1954.
- Moore, Alma Chesnut. *How to Clean Everything*. London: Tom Stacey Ltd., 1972.
- "Pesticides and Posterity." *Horizon*, BBC Television, first aired 30 May 1964 (accessed British Film Institute).
- Rempel, Siegfried, and Wolfgang Rempel. *Health Hazards for Photographers*. New York:

- Lyons & Burford, 1992.
- Schery, Robert W. *A Perfect Lawn the Easy Way*. London: Collier Macmillan Publishers, 1973.
- Shaw, Susan, and David Featherstone. *Overexposure: Health Hazards in Photography*. Carmel: Friends of Photography, 1983.
- Sussman, Aaron. *The Amateur Photographer's Handbook*. 6th rev. ed. New York: Crowell, 1962.
- Sussman, Aaron. *The Amateur Photographer's Handbook*. 8th rev. ed. New York: Crowell, 1973.
- Stout, Ruth, and Richard V. Clemence. *The Ruth Stout No-Work Garden Book*. Emmaus: Rodale Press, 1971.
- Shearcroft, Walter. *A Practical Guide to Photographic Chemicals and Their Uses*. 1 ed. London: Fountain Press, 1942.
- Storey, J. *Running a Home: A Guide to Efficient Household Management*. London: Faber, 1968.
- "'Tabloid' Brand Photographic Developers." 1950? instructional leaflet. (personal collection).
- Thawpit leaflet, no date, 1920s? (personal collection).
- The Harpic Home Book*. London: Harpic Manufacturing Company, 1928.
- The Home-Lovers Encyclopedia*. London: Amalgamated Press, 1933.
- The Usefulness of Soda*. New York: Church & Dwight, 1952.
- Wall, Edward John. *The Photographic Darkroom*. London: Chapman & Hall Ltd, 1934.
- Whitehead, Stanley B. *Garden Weeds and Their Control*. London: J.M. Dent, 1949.
- Whitehead, Stanley B. *Garden Lawns*. London: W. & G. Foyle Ltd, 1955.

Secondary sources

- Adelstein, Peter. "From Metal to Polyester: History of Picture Taking Supports (1987)." In *Issues in the Conservation of Photographs*, ed D.H. Norris and J.J. Gutierrez, 389-393. Los Angeles: Getty Conservation Institute, 2010.
- Aftalion, Fred. *A History of the International Chemical Industry*. Philadelphia: Chemical Heritage Foundation, 2001.
- Al-Gailani, Salim. "Magic, Science and Masculinity: Marketing Toy Chemistry Sets." *Studies in History and Philosophy of Science Part A* 40 (2009): 372-381.
- Allan, Graham, and Graham Crow. *Home and Family: Creating the Domestic Sphere*. Ed. Graham Allan and Graham Crow Basingstoke: Basingstoke: Macmillan, 1989
- Anderson, Stuart, and Virginia Berridge. "The Role of the Community Pharmacist in Health and Welfare 1911-1986." Chapter 2 in *Oral History, Health and Welfare*, 47-73.

London: Routledge, 2000.

Anderson, Stuart, and Virginia Berridge. "Drug Misuse and the Community Pharmacist: A Historical Overview." Chapter 3 in *Drug Misuse and Community Pharmacy*, ed. Janie Sheridan and John Strang, 17-35. London: Taylor and Francis, 2003.

Anderson, Stuart. *Making Medicines: A Brief History of Pharmacy and Pharmaceuticals*. London: Pharmaceutical Press, 2005.

Anderson, Stuart. "Community Pharmacists and Tobacco in Great Britain: From Selling Cigarettes to Smoking Cessation Services." *Addiction* 102 (2007): 704-712.

Atkins, Peter J. *Liquid Materialities: A History of Milk, Science and the Law*. Ashgate Publishing, Ltd., 2012.

Atkinson, John Maxwell. *Discovering Suicide: Studies in the Social Organization of Sudden Death*. London: Macmillan, 1978.

Attar, Dena. *A Bibliography of Household Books Published in Britain, 1800-1914*. London: Prospect Books, 1987.

Attar, Dena. *Wasting Girls' Time: The History and Politics of Home Economics*. London: Virago, 1990.

Auslander, Leora, Amy Bentley, Leor Halevi, H. Otto Sibum, and Christopher Witmore. "AHR Conversation: Historians and the Study of Material Culture." *The American Historical Review* 114 (2009): 1354-1404.

Avery, J.G., and R.H. Jackson. *Children and Their Accidents*. London: Edward Arnold, 1993.

Bartrip, P.W.J. "A 'Pennurth of Arsenic for Rat Poison': The Arsenic Act, 1851 and the Prevention of Secret Poisoning." *Medical History* 36 (1992): 53-69.

Beavan, Brad. *Leisure, Citizenship and Working-Class Men in Britain 1850-1945*. Manchester: Manchester University Press, 2005.

Beck, Ulrich. *Risk Society: Towards a New Modernity*. London: Sage Publications, 1992.

Benson, John, and Laura Ugolini. *A Nation of Shopkeepers: Five Centuries of British Retailing*. London: I.B. Tauris, 2003.

Berridge, Virginia, and Griffith Edwards. *Opium and the People: Opiate Use in Nineteenth-Century England*. New Haven: Yale University Press, 1987.

Bhatti, Mark, and Andrew Church. "'I Never Promised You a Rose Garden': Gender, Leisure and Home-Making." *Leisure Studies* 19 (2000): 183-197.

Bhatti, Mark, and Andrew Church. "Cultivating Natures: Homes and Gardens in Late Modernity." *Sociology* 35 (2001): 365-383.

Bhatti, Mark, and Andrew Church. "Home, the Culture of Nature and Meanings of Gardens in Late Modernity." *Housing Studies* 19 (2004): 37-51.

Bhatti, Mark, Andrew Church, Amanda Claremont, and Paul Stenner. "'I Love Being in the Garden': Enchanting Encounters in Everyday Life." *Social & Cultural Geography* 10 (2009): 61-76.

- Bingham, Adrian. *Family Newspapers?: Sex, Private Life, and the British Popular Press 1918-1978*. Oxford: Oxford University Press, 2009.
- Bingham, Adrian. "Ignoring the first draft of history?" *Media History* 18 (2012): 311-326.
- Black, Graham. "Museums, Memory and History." *Cultural & Social History* 8 (2011): 417-421.
- Black, Lawrence. "Which? Craft in Post-War Britain: The Consumers' Association and the Politics of Affluence." *Albion: A Quarterly Journal Concerned with British Studies* 36 (2004): 52-82.
- Blaszczyk, Regina Lee. *Imagining Consumers: Design and Innovation from Wedgwood to Corning*. (Baltimore and London: John Hopkins University Press, 2000).
- Blaszczyk, Regina Lee. "Marketing Pyrex Ovenware," Chapter 10 in *Major Problems in American Business History*, ed. Regina Lee Blaszczyk and Philip B. Scranton (Boston: Houghton Mifflin Company, 2006).
- Boholm, Åsa. "Comparative Studies of Risk Perception: A Review of Twenty Years of Research." *Journal of Risk Research* 1 (1998): 135-163.
- Boudia, Soraya, and Nathalie Jas. *Powerless Science?: Science and Politics in a Toxic World*. New York: Berghahn Books, 2014.
- Brickman, Ronald, Sheila Jasanoff, and Thomas Ilgen. *Controlling Chemicals: The Politics of Regulation in Europe and the United States*. Ithaca: Cornell University Press, 1985.
- Brown, Bruce. *Images of Family Life in Magazine Advertising 1920 - 1978*. New York: Praeger Publishers, 1981.
- Brown, Kenneth Douglas. *The British Toy Business: A History since 1700*. London: Hambledon Press, 1996.
- Buchan, Ursula. *A Green and Pleasant Land: How England's Gardeners Fought the Second World War*. London: Hutchinson, 2013.
- Bud, Robert. 'Collecting for the Science Museum.' in *Science for the Nation: Perspectives on the History of the Science Museum* ed. Peter Morris (Basingstoke: Palgrave Macmillan UK, 2016)
- Burney, Ian. "A Poisoning of No Substance: The Trials of Medico-Legal Proof in Mid-Victorian England." *Journal of British Studies* 38 (1999): 59-92.
- Burnham, John. "How the Discovery of Accidental Childhood Poisoning Contributed to the Development of Environmentalism in the United States." *Environmental History Review* 19 (1995): 57-81.
- Burnham, John. "Why Did the Infants and Toddlers Die? Shifts in Americans' Ideas of Responsibility for Accidents: From Blaming Mom to Engineering." *Journal of Social History* 29 (1996): 817-837.
- Burnham, John. *Accident Prone: A History of Technology, Psychology, and Misfits of the Machine Age*. London: The University of Chicago Press, 2009.
- Cambridge, E.M. "Benzene and Turpentine: The Pre-History of Dry Cleaning." *Ambix* 38 (1991): 79-84.

- Campbell, W.A. "Oxalic Acid, Epsom Salt and the Poison Bottle." *Human & Experimental Toxicology* 1 (1982): 187-193.
- Casey, P., and J.A. Vale. "Deaths from Pesticides Poisoning in England and Wales: 1945 - 1989." *Human & Experimental Toxicology* 13 (1994): 95-101.
- Clark, John. "Smarden's *Silent Spring*, 1963: Pesticides, Pollution and the Growth of British Environmentalism." seminar *ICSHTM 2013*. Manchester, 2013.
- Clarke, Michael. "The History of Suicide in England and Wales, 1850-1961, with Special Reference to Suicide by Poisoning." Ph.D., Oxford University, 1993.
- Clendinning, Anne. *Demons of Domesticity: Women and the English Gas Industry, 1889-1939*. Aldershot: Ashgate, 2004.
- Combes, Gill. *You Can't Watch Them Twenty-Four Hours a Day: Parents' and Children's Perceptions, Understanding and Experiences of Accidents and Accident Prevention*. Ed. Child Accident Prevention Trust London: London: CAPT, 1991.
- Commoner, Barry. "The Progress That Pollutes." *The Observer*, 09 January 1972.
- Conford, Philip. *The Development of the Organic Network*. Edinburgh: Floris Books, 2011.
- Constantine, Stephen. "Amateur Gardening and Popular Recreation in the 19th and 20th Centuries." *Journal of Social History* 14 (1981): 387-406.
- Cooper, Timothy. "Risk, Time and Everyday Environmentalism in Modern Britain." In *Governing Risks in Modern Britain: Danger, Safety and Accidents C. 1800-2000*, ed. Tom Crook and Mike Esbester, 162-165, London: Palgrave Macmillan, 2016.
- Coote, Jack. *The Illustrated History of Colour Photography*. Surbiton: Fountain Press, 1993.
- "Corporate Profile: Warren H. Moyer." *Journal of Agricultural and Food Chemistry* 3 (1955): 362-363.
- Cousins, Geoffrey. *Golf in Britain: A Social History from the Beginnings to the Present Day*. London: Routledge and Kegan Paul, 1975.
- Cousins, Herbert. *The Chemistry of the Garden*. 3rd ed. London: Macmillan, 1943.
- Cowan, Ruth Schwartz. "The 'Industrial Revolution' in the Home: Household Technology and Social Change in the 20th Century." *Technology and Culture* 17 (1976): 1-23.
- Cowan, Ruth Schwartz. *More Work for Mother: The Ironies of Household Technology from the Open Hearth to the Microwave*. New York: Basic Books, 1983.
- Crane, Catherine, Keith Hawton, Sue Simkin, and Paddy Coulter. "Suicide and the Media: Pitfalls and Prevention." *Crisis* 26 (2005): 42-47.
- Crane, Jennifer. "'The Bones Tell a Story the Child Is Too Young or Too Frightened to Tell': The Battered Child Syndrome in Post-War Britain and America." *Social History of Medicine* 38 (2015): 767-788.
- Crone, Hugh. *Chemicals & Society a Guide to the New Chemical Age*. Cambridge: Cambridge University Press, 1986.
- Crook, Tom, and Mike Esbester. "Risk and the History of Governing Modern Britain,

- C.1800-2000." Chapter 1 in *Governing Risks in Modern Britain: Danger, Safety and Accidents, C.1800-2000*, ed. Tom Crook and Mike Esbester, 1-26, London: Palgrave Macmillan, 2016.
- Cross, Gary. "Valves of Adult Desire: The Regulation and Incitement of Children's Consumption." In *Childhood and Consumer Culture*, ed. David Buckingham and Vebjorg Tingstad, 17-30: Palgrave Macmillan Ltd, 2010.
- Daniel, P. *Toxic Drift: Pesticides and Health in the Post-World War II South*. Baton Rouge: LSU Press, 2007.
- Davidson, Caroline. *A Woman's Work Is Never Done: A History of Housework in the British Isles 1650-1950*. London: Chatto & Windus, 1982.
- Davies, Kate. *The Rise of the U.S. Environmental Health Movement*. Lanham: Rowman & Littlefield Publishers, Inc., 2013.
- Delap, Lucy. "Housework, Housewives and Domestic Workers: Twentieth-Century Dilemmas of Domesticity." *Home Cultures* 8 (2011): 189-210.
- Ditton, Jason. "Perks, Pilferage, and the Fiddle: The Historical Structure of Invisible Wages." *Theory and Society* 4 (1977): 39-71.
- Doherty, Richard E. "The Manufacture, Use and Supply of Chlorinated Solvents in the United States During World War II." *Environmental Forensics* 13 (2012): 7-26.
- Doyle, Jack. *Trespass against Us: Dow Chemical & the Toxic Century*. Monroe: Common Courage Press, 2004.
- Edgerton, David. "Industrial Research in the British Photographic Industry 1879 - 1939." In *The Challenge of New Technology: Innovation in British Business since 1850*, ed. Jonathan Liebenau, 106-125. Aldershot: Gower, 1988.
- Edgerton, David. *The Shock of the Old: Technology and Global History since 1900*. Oxford: Oxford University Press, 2007.
- Edwards, Nick. "The National Poisons Information Service." *Emergency Nurse* 10 (2002): 6.
- Esmail, A., H.R. Anderson, J.D. Ramsey, J. Taylor, and A. Pottier. "Controlling Deaths from Volatile Substance Abuse in Under 18s: The Effects of Legislation." *BMJ* 305 (1992): 692.
- Evans, Clinton Lorne. *The War on Weeds in the Praire West: An Environmental History*. Calgary: University of Calgary Press, 2002.
- Fisher, Tom. "A World of Colour and Bright Shining Surfaces: Experiences of Plastics after the Second World War." *Journal of Design History* 26 (2013): 285-303.
- Flanagan, R. J., B. Widdop, and F.M. Sullivan. "Developments in Toxicology - Retrospect and Prospect." *Human Toxicology* 7 (1988): 391-392.
- Foxell, A.W.H. "Three Cases of Carbon Tetrachloride Poisoning with One Fatality." *BMJ* 1 (1951): 397.
- Fraser, Neil C. "Accidental Poisoning Deaths in British Children 1958-77." *BMJ* 280 (1980): 1595-1598.
- Fraser, W. Hamish. *The Coming of the Mass Market, 1850-1914*. Hamden: Archon Books,

1981.

Betty Friedan, "The Sexual Sell (1963)" Chapter 3 in *The Consumer Society Reader*, ed. Juliet Schor and Douglas Holt (New York: The New Press, 2011).

Gear, Alan, and Jackie Gear. *Organic Gardening: The Whole Story*. London: Watkins, 2009.

Gelber, Steven. *Hobbies: Leisure and the Culture of Work in America*. New York: Columbia University Press, 1999.

Geraghty, Tony. *The Irish War: The Hidden Conflict between the IRA and British Intelligence*. JHU Press, 1998.

Gilbert, David, and Richard Macrory. *Pesticide Related Law*. Farnham: The British Crop Protection Council, 1989.

Gillespie, Brendan. "British 'Safety Policy' and Pesticides." In *Directing Technology*, ed. Ron Johnston and Philip Gummert, 202-224. London: Croom Helm, 1979.

Glaister, John, and Edgar Rentoul. "Drug Treatment of Disease: The Control of the Sale of Poisons and Dangerous Drugs." *BMJ* 2 (1958): 1524-1525.

Gooday, Graeme. *Domesticating Electricity: Technology, Uncertainty and Gender 1880-1914*. London: Pickering and Chatto, 2008.

Goulding, Roy, G. K. Ashforth, and H. Jenkins. "Household Products and Poisoning." *BMJ* 1 (1978): 286-287.

Graham, J.D.P., and R.A.N. Hitchens. "Trends in Hospitalized Accidental Poisoning." *British Journal of Preventive & Social Medicine* 22 (1968): 55-58.

Green, Judith. *Risk and Misfortune: A Social Construction of Accidents*. London; Bristol, Pa.: UCL Press, 1997.

Gronow, Jukka, and Alan Warde. *Ordinary Consumption*. London; New York: Routledge, 2001.

Gurney, Peter. "Co-Operation and the 'New Consumerism' in Interwar England." *Business History* 54 (2012): 905-924.

Haigh, Nigel. *EEC Environmental Policy and Britain*. Harlow: Longman, 1989.

Hamlett, Jane, Andrew Alexander, Adrian Bailey, and Gareth Shaw. "Regulating UK Supermarkets: An Oral-History Perspective." <http://www.historyandpolicy.org/policy-papers/papers/regulating-uk-supermarkets-an-oral-history-perspective>.

Hanna, Erika. "Reading Irish Women's Lives in Photograph Albums." *Cultural & Social History* 11 (2014): 89-109.

Hercock, Robert. J., and George Alan Jones. *Silver by the Ton: The History of Ilford Limited, 1879-1979*. London: McGraw-Hill Book Co., 1979.

Hill, Roland. "Obituary: Dr Richard Mackarness." *The Independent*, 04 April 1996. <http://www.independent.co.uk/news/obituaries/obituary-dr-richard-mackarness-1303347.html> accessed 20 September 2016.

Hilton, Matthew. "Retailing History as Economic and Cultural History: Strategies of

Survival by Specialist Tobacconists in the Mass Market." *Business History* 40 (1998): 115-137.

Hilton, Matthew. *Smoking in British Popular Culture, 1800-2000*. Studies in Popular Culture. Manchester: Manchester University Press, 2000.

Hilton, Matthew. *Consumerism in Twentieth-Century Britain: The Search for a Historical Movement*. Cambridge: Cambridge University Press, 2003.

Hilton, Matthew. "The Banality of Consumption." In *Citizenship and Consumption*, ed Kate Soper and Frank Trentmann, 87-103. London: Palgrave, 2008.

Hilton, Matthew (ed) *A Historical Guide to NGOs in Britain: Charities, Civil Society and the Voluntary Sector since 1945*. Basingstoke: Palgrave Macmillan, 2012.

Hollinger, Richard C., Karen B. Slora, and William Terris. "Deviance in the Fast-Food Restaurant: Correlates of Employee Theft, Altruism and Counterproductivity." *Deviant Behaviour* 13 (1992): 155-184.

Howard, James Keir. "Paraquat - in Use and Misuse." M.D., University of Edinburgh, 1982.

Ihde, Aaron J. *The Development of Modern Chemistry*. Courier Dover Publications, 1970.

Ilmonen, Kaj. "Sociology, Consumption and Routine." In *Ordinary Consumption*, ed. Jukka Gronow and Alan Warde, 9-24. London: Routledge, 2001.

Jackson, Mark. *Allergy the History of a Modern Malady*. London: Reaktion Books, 2006.

Jay, Bill. "Dangers in the Dark." <http://cmcsart.weebly.com/dangers-in-the-dark-history-of-photography.html>.

Jay, Bill. *Cyanide & Spirits: An Inside-out View of Early Photography*. Munich: Nazraeli Press, 1991.

Jeffreys, James B. *Retail Trading in Britain 1850-1950*. Cambridge: Cambridge University Press, 1954.

Joiner, Thomas E. "The Clustering and Contagion of Suicide." *Current Directions in Psychological Science* 8 (1999): 89-92.

Jones, Marian Moser, and Isidor Daniel Benrubi. "Poison Politics: A Contentious History of Consumer Protection against Dangerous Household Chemicals in the United States." *American Journal of Public Health* 103 (2013): 801-812.

Kavanagh, Gaynor. *Making Histories in Museums*. London: Bloomsbury Publishing, 2005.

Kehoe, Terence. "Merchants of Pollution?: The Soap and Detergent Industry and the Fight to Restore Great Lakes Water Quality, 1965-1972." *Environmental History Review* 16 (1992): 21-46.

Kelley, Victoria. *Soap and Water: Cleanliness, Dirt and the Working Classes in Victorian and Edwardian Britain*. London: Tauris, 2010.

Kennedy, Carol. *I.C.I.: The Company That Changed Our Lives*. London: Paul Chapman Publishing, 1993.

Kenyon, Dave. *Inside Amateur Photography*. London: Batsford Cultural Studies, 1992.

- Kirby, Celia. *The Hormone Weedkillers: A Short History of Their Discovery and Development*. Croydon: British Crop Protection Council, 1980.
- Knud-Hansen, Chris. "Historical Perspective of the Phosphate Detergent Conflict." 1994. Accessed 02 August 2016.
http://www.colorado.edu/conflict/full_text_search/AllCRCDocs/94-54.htm
- Kynaston, David. *Family Britain 1951-1957*. Volume 2 (London: Bloomsbury, 2010).
- Lake, Robert J. *A Social History of Tennis in Britain*. Abingdon: Routledge, 2014.
- Langhamer, Claire. "The Meanings of Home in Postwar Britain." *Journal of Contemporary History* 40 (2005): 341-362.
- Langston, Nancy. "The Retreat from Precaution: Regulating Diethylstilbestrol (DES), Endocrine Disruptors and Environmental Health." *Environmental History* 13 (2008): 41-65.
- Lanman, Susan. "Colour in the Garden: 'Malignant Magenta'." *Garden History* 28 (2000): 209-221.
- Lambrecht, Ralph. "From Exposure to Print: The Essentials of Silver-Halide Photography Required for Long-Lasting, High-Quality Prints." in *The Focal Encyclopedia of Photography*, ed. Michael Peres, 664-692. London: Elsevier, 2013.
- Lipson, Juliene. "We Are the Canaries: Self-Care in Multiple Chemical Sensitivity Sufferers." *Qualitative Health Research* 11 (2001): 103-116.
- Luckin, Bill. "The Heart and Home of Horror': The Great London Fogs of the Late Nineteenth Century." *Social History* 28 (2003): 31-48.
- Macdonald, Sharon. *The Politics of Display: Museums, Science, Culture*. Taylor & Francis, 2010.
- Maffei, Grace Lees. *Design at Home: Domestic Advice Books in Britain and the USA since 1945*. Routledge, 2013.
- Markowitz, Gerald, and David Rosner. "'Cater to the Children': The Role of the Lead Industry in a Public Health Tragedy, 1900-1955." *American Journal of Public Health* 90 (2000): 36-45.
- Markowitz, Gerald, and David Rosner. *Deceit and Denial: The Deadly Politics of Industrial Pollution*. Berkley: University of California Press, 2013.
- Martens, Lydia and Sue Scott. "'The Unbearable Lightness of Cleaning': Representations of Domestic Practice and Products in Good Housekeeping Magazine (UK): 1951-2001." *Consumption, Markets and Culture* 8 (2005): 379-401.
- Martens, Lydia and Sue Scott. "Under the Kitchen Surface: Domestic Products and Conflicting Constructions of Home." *Home Cultures* 3 (2006): 39-62.
- Martin, Ann Smart. "Makers, Buyers and Users: Consumerism as a Material Culture Framework." *Winterthur Portfolio* 28 (1993): 141-157.
- McCulloch, Jock and Geoffrey Tweedale. *Defending the Indefensible: The Global Asbestos Industry and Its Fight for Survival*. Oxford: Oxford University Press, 2008.
- McKay, George. *Radical Gardening: Politics Idealism & Rebellion in the Garden*. London:

Frances Lincoln Limited, 2011.

McKenzie, A. G. "Carbon Tetrachloride as an Anaesthetic." In *History of Anaesthesia Society Autumn Scientific Meeting*, 7-11, Chequer Mead Arts Centre, East Grinstead, 2003.

Millard, Chris. *A History of Self-Harm in Britain*. Basingstoke: Palgrave Macmillan, 2015.

Miller, Daniel. *A Theory of Shopping*. Cambridge: Polity Press, 1998.

Mohun, Arwen. *Risk: Negotiating Safety in American Society*. Baltimore: Johns Hopkins University Press, 2013.

Mohun, Arwen, Thomas Le Roux, Tom Crook, and Mike Esbester. "Conclusion: Governing Risks in Britain and Beyond." Chapter 13 in *Governing Risks in Modern Britain: Danger, Safety and Accidents, C. 1800-2000*, ed. Tom Crook and Mike Esbester, 297-307. London: Palgrave Macmillan, 2016.

Morris, Peter. "The Image of Chemistry Presented by the Science Museum, London, in the Twentieth Century: An International Perspective." *HYLE* 12 (2006): 215-239.

Morris, Peter. *Science for the Nation: Perspectives on the History of the Science Museum*. Palgrave Macmillan UK, 2016.

Morris, Peter. "A Tale of Two Nations: DDT in the USA and the UK." In *Hazardous Chemicals: Agents of Risk and Change (1800 - 2000)*, ed. Elisabeth Vaupel and Ernst Homburg. Oxford: Berghahn Books, forthcoming.

Morrison, Robert D., and Brian L. Murphy. *Chlorinated Solvents: A Forensic Evaluation*. Cambridge: Royal Society of Chemistry, 2013.

Musson, A.E. *Enterprise in Soap and Chemicals: Joseph Crosfield & Sons Limited 1815 - 1965*. Manchester: University of Manchester, 1965.

Nell, Dawn, Simon Phillips, Andrew Alexander, and Gareth Shaw. "Helping Yourself: Self-Service Grocery Retailing and Shoplifting in Britain, C.1950-75." *Cultural & Social History* 8 (2011): 371-391.

Neuhaus, Jessamyn. *Housework and Housewives in Modern American Advertising: Married to the Mop*. New York: Palgrave Macmillan, 2011.

Newstead, John. *A Pharmacist's Tale*. Wymondham: John Nickalls Publications, 2003.

Nicklas, Charlotte Crosby. "Splendid Hues: Colour, Dyes, Everyday Science and Women's Fashion, 1840-1875." Ph.D, University of Brighton 2009.

Nixon, Sean. "Mrs Housewife and the Ad Men: Advertising, Market Research and Mass Consumption in Postwar Britain." Chapter 9 In *The Rise of Marketing and Market Research*, ed. H. Berghoff, P. Scranton and U. Spiekermann, 193-213, New York: Palgrave Macmillan, 2012.

O'Donoghue, Jim, Carol McDonnell, and Martin Placek. "Consumer Price Inflation 1947-2004." *Economic Trends* 626 (2006): 38-53.

O'Hara, Glen. *The Politics of Water in Post-War Britain*. Basingstoke: Palgrave Macmillan, 2017.

Oakley, Ann. *Housewife*. (London: A. Lane, 1974).

- Oldenziel, Ruth. *Making Technology Masculine: Men, Women and Modern Machines in America, 1870-1945*. Amsterdam: Amsterdam University Press, 1999.
- Olivier, Marc. "George Eastman's Modern Stone-Age Family: Snapshot Photography and the Brownie." *Technology and Culture* 48 (2007): 1-19.
- Ott, Brian, Eric Aoki and Greg Dickinson. "Ways of (Not) Seeing Guns: Presence and Absence at the Cody Firearms Museum." *Communication and Critical/Cultural Studies* 8 (2011): 215-239.
- Oudshorn, Nelly, and Trevor Pinch, *How Users Matter: The Co-Construction of Users and Technology*. London: MIT Press, 2005.
- Padiak, Janet. "Suicide in the British Army, 1830-1900." In *Histories of Suicide: International Perspectives on Self-Destruction in the Modern World*, ed. John Weaver and David Wright, 119-134. Toronto: University of Toronto Press, 2009.
- Parr, Joy. "What Makes Washday Less Blue? Gender, Nation and Technology Choice in Postwar Canada." *Technology and Culture* 38 (1997): 153-186.
- Payne, J. The Criminal Use of Carbon Tetrachloride." In *History of Anaesthesia Society Autumn Scientific Meeting*, 12-13. Chequer Mead Arts Centre, East Grinstead, 2003.
- Pember Reeves, Maud. *Round About a Pound a Week*. New York: Garland Pub., 1980.
- Pink, Sarah. "Dirty Laundry. Everyday Practice, Sensory Engagement and the Constitution of Identity." *Social Anthropology* 13 (2005): 275-290.
- Podger, Hugh. *Albright & Wilson: The Last 50 Years*. Sudley: Brewin Books Ltd, 2002.
- Polson, C. J. "The Role of the Pathologist in the Investigation of Fatal Poisoning." *Medicine, Science and the Law* 5 (1965): 203-210.
- Poyner, Barry, and Nigel Hughes. *Home and Leisure Accident Research: Personal Factors in Domestic Accidents*. Translated by Department of Trade and Industry. London: Department of Trade and Industry, 1980.
- Pritchard, Michael. "Who Were the Amateur Photographers?". *either / and* 03 June 2013. <http://eitherand.org/reconsidering-amateur-photography/who-were-amateur-photographers/> (accessed 04 October 2015).
- Quest-Ritson, Charles. *The English Garden: A Social History*. London: Penguin, 2001.
- Quirke, Viviane. "Thalidomide, Drug Safety Regulation and the British Pharmaceutical Industry: The Case of Imperial Chemical Industries." Chapter 6 in *Ways of Regulating Drugs in the 19th and 20th Centuries*, ed. Jean-Paul Gaudillière and Volker Hess, 181-205. Basingstoke: Palgrave, 2013.
- Raisborough, Jayne, and Mark Bhatti. "Women's Leisure and Auto/Biography: Empowerment and Resistance in the Garden." *Journal of Leisure Research* 39 (2007): 459-476.
- Randell, G.H.W. "Letters to the Editor: Using Rubber Gloves." *APC*, 14 September 1938.
- Ravetz, Alison, and Richard Turkington. *The Place of Home: English Domestic Environments, 1914 - 2000*. London: E & FN Spon, 1995.
- Rawle, Graham. "Photographic 'Artistry' in 1950s Men's Magazines." *either / and* 16

- June 2013 <http://eitherand.org/reconsidering-amateur-photography/photographic-artistry-1950s-mens-magazines/> (accessed 06 October 2015).
- Reader, William. *Imperial Chemical Industries: A History*. London: Oxford U.P., 1970.
- Reader, William. *Fifty Years of Unilever, 1930-1980*. London: Heinemann, 1980.
- Reed, Peter. "Making War Work for Industry: The United Alkali Company's Central Laboratory During World War One." *Ambix* 62 (2015): 72-93.
- Richardson, M. *Risk Management of Chemicals*. Cambridge: Royal Society of Chemistry, 1992.
- Robbins, Paul. *Lawn People: How Grasses, Weeds, and Chemicals Make Us Who We Are*. Philadelphia: Temple University Press, 2007.
- Rocke, Alan J. *The Quiet Revolution: Hermann Kolbe and the Science of Organic Chemistry*. Berkely: University of California Press, 1993.
- Romano, Carlin. "What? The Grisly Truth About Bare Facts." in *Reading the News*, ed. Robert Manoff and Michael Schudson, 38-78. New York: Pantheon, 1986.
- Scrine, Clair. "'More Deadly Than the Male' the Sexual Politics of Female Poisoning: Trials of the Thallium Women." *Limina* 8 (2002): 127-143.
- Shamasunder, Bhavna. "Body Burden Politics: How Biomonitoring Data Is Influencing Chemicals Governance in the U.S." Ph.D., University of California, Berkeley, 2011.
- Shorter, Edward. "Multiple Chemical Sensitivity: Pseudodisease in Historical Perspective." *Scandinavian Journal of Work, Environment & Health* 23, supplement 3 (1997): 35-42.
- Sigal, Leon. "Sources Make the News." in *Reading the News*, ed. Robert Manoff and Michael Schudson, 9-37. New York: Pantheon, 1986.
- Starn, Randolph. "A Historian's Brief Guide to New Museum Studies." *The American Historical Review* 110 (2005): 68-98.
- Stebbins, Robert. *Leisure and Consumption: Common Ground/Separate Worlds*. New York: Palgrave Macmillan, 2009.
- Strasser, Susan. *Never Done: A History of American Housework*. New York: Pantheon Books, 1982.
- Stobart, Jon. "A History of Shopping: The Missing Link between Retail and Consumer Revolutions." *Journal of Historical Research in Marketing* 2 (2010): 342-349.
- Suckling C. W. and B. W. Langley "Francis Leslie Rose. 27 June 1909-3 March 1988." *Biographical Memoirs of Fellows of the Royal Society* 36 (1990), 491-524.
- Tarr, Joel A., and Mark Tebeau. "Managing Danger in the Home Environment, 1900-1940." *Journal of Social History* 29 (1996): 797-816.
- Taylor, Lisa. *A Taste for Gardening: Classed and Gendered Practices*. Oxford: Routledge, 2016.
- Taylor, John. "Kodak and the 'English' Market between the Wars." *Journal of Design History* 7 (1994): 29-42.

- Taylor, Valerie, and Amanda Bower. "Improving Product Instruction Compliance: 'If You Tell Me Why, I Might Comply'." *Psychology & Marketing* 21 (2004): 229-245.
- Thompson, Paul. "The voice of the past" Chapter 2 in *The Oral History Reader* ed. Robert Perks and Alistair Thomson, 21-28. New York: Routledge, 2006.
- Todd, Selina. "Domestic Service and Class Relations in Britain 1900-1950." *Past & Present* 203 (2009): 181-204.
- Towner, Elizabeth, Therese Dowswell, and Stephen Jarvis. *Reducing Childhood Accidents: The Effectiveness of Health Promotion Interventions a Literature Review*. London: Health Education Authority, 1993.
- Trentmann, Frank. "Citizenship and Consumption." *Journal of Consumer Culture* 7 (2007): 155.
- Tungate, Mark. *Adland: A Global History of Advertising*. London: Kogan Page, 2013.
- Tunstall, Jeremy. *Newspaper Power: The New National Press in Britain*. Oxford: Clarendon Press, 1996.
- Tweeddale, Geoffrey. *At the Sign of the Plough: 275 Years of Allen & Hanburys and the British Pharmaceutical Industry, 1715-1990*. London: J. Murray, 1990.
- Vieira, Ryan "Rethinking the History of the Risk Society: Accident Reporting, the Social Order and the London Daily Press, 1800-30." Chapter 3 in *Governing Risks in Modern Britain: Danger, Safety and Accidents, C.1800-2000*, ed. Tom Crook and Mike Esbester, 55-76: London: Palgrave Macmillan, 2016.
- Viscusi, W. Kip. "Consumer Behavior and the Safety Effects of Product Safety Regulation." *Journal of Law and Economics* 28 (1985): 527-553.
- Vogel, David. *The Politics of Precaution: Regulating Health, Safety, and Environmental Risks in Europe and the United States*. Princeton: Princeton University Press, 2012.
- Vogel, Sarah. "From 'the Dose Makes the Poison' to 'the Timing Makes the Poison': Conceptualizing Risk in the Synthetic Age." *Environmental History* 13 (2008): 667-673.
- Wain, R.L. "William Robert Boon 20 March 1911-28 October 1994." *Biographical Memoirs of Fellows of the Royal Society* 43 (1997): 134-141.
- Watson, James. "The Significance of Mr Richard Buckley's Exploding Trousers: Reflections on an Aspect of Technological Change in New Zealand Dairy Farming between the World Wars." *Agricultural History* 78 (2004): 346-360.
- Watson, Joyce. "Clinical and Laboratory Investigations in 132 Cases of Solvent Abuse." *Medicine, Science and the Law* 18 (1978): 40-43.
- Watson, Katherine. *Poisoned Lives: English Poisoners and Their Victims*. London: Hambledon and London, 2004.
- Watson, Katherine. "Is a Burn a Wound? Vitriol-Throwing in Medico-Legal Context, 1800-1900." Chapter 4 in *Lawyers' Medicine: The Legislature, the Courts and Medical Practice 1760-2000*, ed. Imogen Goolld and Catherine Kelly, 61-78. Oxford: Hart, 2009.
- Watson, Katherine. "Loss of Face - Vitriol Throwing in 19th and 20th Century Britain." Seminar, Oxford Brookes University, 27 March 2013.

- Whorton, James. *The Arsenic Century: How Victorian Britain Was Poisoned at Home, Work, and Play*. Oxford: Oxford University Press, 2010.
- Whyte, Susan Reynolds, Sjaak van der Geest, and Anita Hardon. *Social Lives of Medicines*. Cambridge: Cambridge University Press, 2002.
- Whyte, Rebecca. "Preventing Accidents, Prioritising Health: Disinfectants, Disease and the Plurality of Risk." In *Accidents and Emergencies*, Conference, Oxford Brookes University, September 2013.
- Whyte, Rebecca. "Public Health and Public Safety: Disinfection, Carbolic and the Plurality of Risk, 1870-1914" Chapter 6 in *Governing Risks in Modern Britain: Danger, Safety and Accidents C. 1800-2000*, ed. Tom Crook and Mike Esbester, 127-148. London: Palgrave Macmillan, 2016.
- Wiles, Margaret. *Gardens of the British Working Class*. New Haven: Yale University Press, 2014.
- Williams, A.N., and N.K. Griffin. "100 Years of Lost Opportunity. Missed Descriptions of Child Abuse in the 19th Century and Beyond." *Child Abuse & Neglect* 32 (2008): 920-924.
- Williams, Jack. "Broadcasting and Cricket in England." Chapter 4 in *The Cambridge Companion to Cricket*, ed. Anthony Bateman and Jeffrey Hill, 55-69. Cambridge: Cambridge University Press, 2011.
- Williams, Stephen. *Outdoor Recreation and the Urban Environment*. London: Routledge, 1995.
- Wilson, Mark. "To What Extent Was the British Reaction to 'Silent Spring' Indicative of a Tradition of Top-Down Environmentalism?." M.Sc., University of Northumberland, 2010.
- Winship, Janice. *Inside Women's Magazines*. London: Pandora, 1987.
- Wood, John Carter. "'Those Who Have Had Trouble Can Sympathise with You': Press Writing, Reader Responses and a Murder Trial in Interwar Britain." *Journal of Social History* (2009): 339-362.
- World Health Organisation and Food and Agriculture Organisation of the United Nations. *Pesticide Residues in Food - 2004*. Rome: WHO, 2005.
- Wynter Blyth, Alexander, and Meredith Wynter Blyth. *Poisons: Their Effects and Detection*. 5th ed. London: C. Griffin & Company, 1920.
- Zelizer, Viviana A. Rotman. *Pricing the Priceless Child: The Changing Social Value of Children*. New York: Basic Books, 1985.
- Zweiniger-Bargielowska, Ina. *Women in Twentieth-Century Britain*. Harlow: Longman, 2001.
- Zweiniger-Bargielowska, Ina. *Austerity in Britain: Rationing, Controls, and Consumption, 1939-1955*. Oxford: Oxford University Press, 2000.

Image Acknowledgements

© Bodleian Library, Oxford University

Figure 4.1: Reader's suggestion (PG December 1966)

Figure 4.2: Reader's suggestion (PG April 1964)

Figure 4.4: Cooke's sodium chlorate advert, (PG, 1981)

Figure 4.5: Bird's sodium chlorate advert, (PG, 1966)

Figure 5.1: Johnson's (AP, 06 December 1944, front page)

Figure 5.2: Kodak advert (AP 30 April 1941 front page)

Figure 5.3: Adverts from Burroughs Wellcome & Company Tabloid and Johnsons (AP 24 September 1944, p2)

Figure 5.5: Passing film through solutions (AP 1938)

© British Library Board

Figure 3.2: Carbosil advert (*The Sunderland Echo and Shipping Gazette*, 23 March 1932)

Figure 3.3: Carbosil advert (*Coventry Evening Telegraph*, 06 August 1941)

Figure 3.5: Thawpitt advert (*The Northern Daily Mail*, 24 July 1945; *The Northern Daily Mail*, 16 June 1946)

Figure 5.6: Using magnesium to develop photos (*Kodak Magazine*, January 1930)

© The Times Digital Archive

Figure 3.4: ICI's response to paper control order (1941)

© The Daily Mail Historical Archive

Figure 4.9: Weedol advert (08 April 1971)

© London Metropolitan Archives

Figure 3.1: BF 1/1/19a 66/1877 (accessed at Institute of Education Archives)

© Science Museum / Science & Society Picture Library

Figure 4.3: Chipman Chemical Co Ltd carriage in 1955, National Railway Museum

Figure 5.7: object number 1990-5036/3609/2/1, National Media Museum

Figure 5.8: object number 1979-0486, Science Museum

© The Walgreens Boots Alliance Archive, Nottingham

Figure 3.6: Taken from an internal Boots magazine (1954)

Figure 4.8: Announcement sent to all Boots branches (1970)

Figure 6.1: Illustration from a Boots Lornox brochure (1948)