Literature review

**Cleanliness**

Histories of bodily cleanliness have been enthusiastically studied, but the domestic environment and surfaces within it have not received the same level of attention.[[1]](#footnote-2) Tomes,[[2]](#footnote-3) Kelley,[[3]](#footnote-4) and Whyte have identified and elaborated on the theme of protecting the health of the family through domestic cleaning practices. Domestic disinfection, in relation to state monitored hygiene following outbreaks of disease, is a special case that Whyte has investigated, with the use of carbolic acid in British Victorian and Edwardian homes forming part of a case study of particular relevance to this thesis in its study of chemicals in the home.[[4]](#footnote-5) The period studied by these three authors predates that covered by this thesis, so although many of the ideas, practices and possibly some of the products or equipment might have stayed the same, the upheaval and changes wrought through world war and economic cycles of growth and depression that occurred between 1930 and the 1980s require that the processes and material culture are reexamined.

Marten and Scott's survey of Good Housekeeping magazine demonstrates a decline in the advertisement of cleaning products from the 1960s, which they describe as entering the aspirational era, showing images of idealised glistening homes, but did not inform readers about the practices and products involved in how to attain this level of cleanliness.[[5]](#footnote-6) In the sample of magazines examined for this project, that same decline was observed, but it was also acknowledged by those who did advertise. A Goddard's silver polish advert explicitly stated "You must have better things to do than polish silver".[[6]](#footnote-7) Goddard's had focused on the use of time in previous adverts, as did most of the other chemical aids.

Martens and Scott also point out that from the 1950s in editorial for Good Housekeeping, there was a move away from a focus on germs, to that of olfactory and visual appearances, smelling fresh, looking bright, with these qualities becoming the end themselves.[[7]](#footnote-8) They state that the threat from germs became a distant memory, and despite an interest in germs did not find the explicit references to food hygiene that they were expecting in greater frequency.[[8]](#footnote-9) The manufacturers and advertisers were the ones who kept germs in sight. However, food poisoning outbreaks such as Salmonella were rising in the 1950s,[[9]](#footnote-10) so it is surprising that the focus on germ management in the kitchen waned. Outbreaks of Salmonella influenced the advertising tactic of Zal disinfectant in 1975, which promised that the use of that product would eliminate these specific bacterial targets and protect the family.[[10]](#footnote-11)

Home economics, or domestic science, is an area that could be expected to deliver messages about cleanliness. However, most of the discussion in the field has centred upon justifying the continued provision of the subject in schools and its alignment with science, but the practical angle has been food preparation or being a rational consumer, rather than hygiene or cleanliness.[[11]](#footnote-12) Home management manuals or guides for new brides have formed the basis of surprisingly few studies. The content of manuals that I reviewed was very generic; timetables for tasks, first aid guidance, recipes for invalids, choosing domestic appliances, stain removal remedies for a variety of surfaces but not until the 1970s did branded goods start to be recommended.

*Clothes and laundry: Stain removal*

The mechanical technologies of laundry and processes (labour, time) associated with the cleaning domestic textiles either in the home, or sending them out to be done, have been well documented.[[12]](#footnote-13) The alternatives to full home or professional laundering, such as spot cleaning, or even stain removal before or after laundering, have been less well covered in these scholarly historical studies. Textile conservators have a special interest in cleaning stained garments, with a particular awareness of the significance of certain types of stain.[[13]](#footnote-14) The literature of home economics, or domestic science, is the site of some discussion about practical stain removal, as well as the transmission of the practice.[[14]](#footnote-15) However, the histories of stain removal techniques have been overlooked. Spot stain removal methods are associated with a level of expertise, of understanding the type of stain, the textile and the possible actions of available stain removers on both the stain and the textile. The stains and textiles listed in the manuals provides an interesting window on the eras that the book was written in, showing changes in activities that might be done, foods and drinks that might be eaten, as well as the changing variety of stain removing chemicals. This makes the subject ripe for study in the sense of making use of chemicals for spot cleaning and stain removal. The case study of carbon tetrachloride is an opportunity to look at the issues of users and chemical safety, branding and packaging.

Smells

The literature on cultural significance of smells is dominated by Alain Corbain. Also relevant to this research is the literature produced by those working in the fragrance industry, who are concerned with creating products with scents that communicate meanings to the user. Jellinek is one such author, special because he does not only write about luxury fragrances but also consumer products.

*Insert examples.* It is unclear how or why scents acquire these meanings, but their correct use is critical for the success of products.

**Gardening**

Since Stephen Constantine pointed out that popular gardening has not received much attention from historians,[[15]](#footnote-16) little had changed. Most garden history concentrate on famous designers and the gardens they worked on, usually large ornamental gardens for wealthier families with gardening staff.[[16]](#footnote-17) There are exceptions. Miles Hadfield briefly covered the fads and fashions of the middle and lower income gardening as generally 'an escape into nature and away from the mechanical world', although including the use of labour saving paving, chemical sprays and 'horrifying marvels of science' to combat garden pests.[[17]](#footnote-18) Constantine also wrote about the

Gardening is closely tied to town planning, which determines whether a dwelling will have a garden. Hoyles gathered data on the importance placed on space for householders to garden, which was campaigned for by politicians and planners during housing developments in the interwar periods.[[18]](#footnote-19) Income, to afford a dwelling with somewhere to garden, is tied into class, and as well as available leisure time to use it, class is involved in how it is used. A working class home with a garden or yard could use it to grow fruit and vegetables, or keep chickens or rabbits. More affluent homes might devote the space to flowers, shrubs and trees. I consider allotments an extension of domestic space, as although they are not necessarily located near the physical building treated as a home, a user of allotment may feel at home, they care for the space there, and there is traffic of items between home and allotment.

Not only were government agencies interested in the space available to garden, they also had input into what should be grown and how. During the need to reduce reliance on imported food during and after the second world war, efficiently growing food on a small scale at home or on allotments was the subject of Ministry of Agriculture leaflets advising on how to maximise production, which included a large variety of chemical means.[[19]](#footnote-20) Buchan questioned how successful the Dig for Victory campaign really was with respect to growing food, and examined the intensive digging practices promoted by the Ministry as a type of occupational therapy for British citizens. An interesting point was made, but not expanded, regarding a regional example of low take-up of chemical fertilisers by women who had taken over allotment duties from their husbands while they were away, or killed, fighting, which perhaps hints at a difference in attitudes towards chemicals between women and men.[[20]](#footnote-21) Another outcome outlined in this book is the development of compound fertilisers and composts in order to make gardening more reliable than making up ones own fertilisers from simple chemicals.[[21]](#footnote-22) Buchan does not develop these ideas further, so it is hard to get an idea of how the users in her stories made decisions about and interacted with the different forms of chemical available to make their food production more bounteous.

Buchan examined the literature produced to support the Dig for Victory campaign.[[22]](#footnote-23) Government publications such as *Chemicals for the Gardener*,*[[23]](#footnote-24)* aimed specifically at amateur gardeners, as well as numerous manuals and practical magazines which reviewed chemical products then advised on their use. Hoyles reports studies on the high efficiency of food production in small gardens of working class houses compared to dedicated farmland.[[24]](#footnote-25)

Research on the American domestic lawn provides an interesting point of potential comparison with UK lawns. Conformity and participation in the neighbourhood is embodied through the production of a manicured front lawn. The reduction in agricultural herbicides and pesticides is estimated to have been exceeded by the increased amount that is used domestically to perform this act of care and belonging.[[25]](#footnote-26) If there is equivalent literature on British domestic lawns it is yet to be located.

Gardening as leisure[[26]](#footnote-27) has been the focus of the limited amount of scholarship on the ordinary or everyday practice of gardening, with discussions of motivations for gardening and gendered division of labour. The use of chemicals is most often mentioned merely in passing, and left under explored. However, histories of technology can provide another way of looking at gardening. The lawnmower, its users and associated networks of consumer advocates, safety campaigners, legislators and manufacturing companies, provided Arwen Mohun with excellent material to explore the management of risk in the garden, with respect to this particular technology.[[27]](#footnote-28) This provides a comparison to the risk presented by chemicals.

**Chemicals in the garden (and on the allotment)**

Considering the non-use of chemicals in the garden, histories of organic gardening in Britain are vague about the prevalence of chemical use, with statements such as 'throughout the 1960s persistent chemicals were used in a cavalier fashion'[[28]](#footnote-29) which are left unexamined and we learn nothing more about the users, what they knew or why or how they chose to use chemicals in their home gardens. Membership of organisations such as the Henry Doubleday Foundation or the Soil Association indicates increasing interest in organic methods, but only really show up the most concerned joiners rather than those who may not use chemical methods but are not sufficiently motivated to become part of organisations like these.

Reasons for becoming interested in organic gardening methods are often health oriented, concern for wider ecosystems, disillusionment with chemical methods as pest resistance emerged or soil quality deteriorated, not to mention distaste for the notions that gardens could become another place where people were trapped in escalating consumption of manufactured products.[[29]](#footnote-30) The total rejection of industrially manufactured chemicals is held as the only practice, whereas there may be users who mix the application of ready-made garden chemical aids with organic methods such as composting. The users who choose elements of both types of practice to create another, fluid option are not considered by those writing about organic methods. In this thesis I hope to show garden chemical users as more complex than they have previously been portrayed.

On the topic of agriculturally used pesticides, such as xxx, their development and application has been covered in technical documentation[[30]](#footnote-31) but the development and use of equivalent domestic pesticides has not been so wide ranging. Reviews are limited to contemporary usage studies and effects on human health, rather than long-view, historical development, or in-depth user research. In addition, these reviews are carried out by researchers in the USA, looking at American homes.[[31]](#footnote-32) [[32]](#footnote-33) Although some products are available in the UK, this country has been subject to different regulations as well as different populations and prevalences of pests which affect the regularity of domestic pesticide use. DDT has attracted most attention for its widespread use on farms as well as in homes, and its position in the ecosystem as a persistent, bioaccumulating chemical. Rachel Carson's book *Silent Spring* is hailed as calling attention to the consequences of using indiscriminate chemical control, although as Gunter and Harris point out, concerns about the use of DDT on wildlife in the USA as well as resistance to the chemical had been publicly raised long before Carson championed it.[[33]](#footnote-34) Wilson also showed that the question of effects of agricultural pesticides on British wildlife was on the table before Silent Spring brought the issue to even wider consciousness.[[34]](#footnote-35)

Even so, the choice to use DDT as incorporated into everyday household chemical products, as opposed to applied specifically for malaria control, has not been well examined. Instead, the unwitting or no-choice exposure to the pesticides in the form of residues on produce, or from drift, is the principal way that these chemicals are seen to enter, uninvited the domestic environment. Watson similarly looks at the tragic effect of the weedkiller sodium chlorate brought inadvertently from the field where it was applied, back to a domestic setting where it could cause fires, but not at any deliberate uses of the chemical outside of agricultural scenarios.[[35]](#footnote-36)

The publications of the activist organisation Pesticide Action Network appear as a source of primary information about the use and consequences of a variety of herbicides and insecticides in a wide variety of publications. Their data sheets are easily accessible to modern researchers and are taken as authoritative, truthful information. Much of the focus is on protecting agricultural workers, especially those in the developing world, but delivered from the stance of concerned non-users who wish to avoid chemical residues in the produce they consume.

This aspect of consent to exposure can be seen in other investigations of chemicals in the home, such as food additives,[[36]](#footnote-37) water fluoridation,[[37]](#footnote-38) materials used in construction,[[38]](#footnote-39) sick building syndrome,[[39]](#footnote-40) and culminating in multiple chemical sensitivity[[40]](#footnote-41) and rights to freedom from chemical fragrance.[[41]](#footnote-42) Human health is central to all these investigations, as is the concept of providing information in order that those things can be avoided. These chemicals are ubiquitous but the number of people who are severely affected, or feel strongly about the possibilities of being severely affected, are small. The severity of effects, whether quantifiable by others or perceived only by the sufferer, means that these types of cases are intriguing to study, whereas other chemical exposures with less frequent, slower or less dramatic changes, or with less clear cut roles of good and bad, have not received the same level of study.

**Experts**

The construction of expert committees was examined in Merchants of Doubt,[[42]](#footnote-43) which exposed deliberate inclusion of contrary characters, not to ensure rigourous questioning but for the potential to mislead the group, distracting the committee from their task, derailing the productive use of time by directing the group to needless questions. This research focussed on committees in the United States, but it should open researchers eyes to the potential for this type of personal interaction within expert committees studied in Britain. So far, what I have read about the relevant committees does not indicate that there was this type of wilful disruption going on.

Pesticides Safety Precautionary Scheme

Poisons Rules

Industrial Physicians

**Social construction of technology**

Technology in this case can be understood as a designed substances, objects, actions and knowledges, however rule of thumb or technical (Bigelow).

**Users**

Users bring their own experiences, practices and interpretations to using products. This is understood in the way tests are done on likely acceptance of new products. Highlighting the many small differences between the way that people use the same product, Jellinek advised that controlled user tests give quicker, cheaper and more reliable results rather than completely natural home use tests where the huge number of variables between the ways that the product will be used is uncontrollable and unknown.[[43]](#footnote-44)

In Meikle's examination of the reuse of plastic bags there are many similarities with the use or misuse seen in household chemicals. He showed a pattern of praise for the new technology, followed by accidents affecting children, in which children were left unattended with bags and became asphyxiated, which were followed by adult suicides. There was media uproar and media experimentation with plastic bags. The company denounced the misuse of the bags by the user, but were also worked to make the bags safer to avoid the consequences of misuse, and eventually keeping bags away from children became common sense, although accidents never entirely stopped and the media attention deceased.[[44]](#footnote-45)

**Domesticity and modernity**

Emily Hankin

Kelley – re Light, conservative modernity

**Risk**

**Private and Public Spheres**

Habermas

Kelley described the development of 'partial, cramped and imperfect freedom' for women in the domestic sphere brought about by the public sphere widening in the inclusion of women, and by the availability of consumer products that aided housework.[[45]](#footnote-46)

Front gardens and yards are visible by the public, and as Paul Robbins notes the lawn can be the root of community pressure to keep maintain uniformity in the neighbourhood, at least in the USA.[[46]](#footnote-47) This strength of feeling, and associated intrusion into the way that the visible space is kept has not been commented on by historians of British lawns, domesticity or housing, in anywhere near the same way that cleanliness and hygiene inside the house has been written about, suggesting that the garden is somehow different. MJ Daunton wrote about the use of outside space in Victorian working class households, including drying laundry in the front yard provided to keep the laundry lines out of the streets themselves,[[47]](#footnote-48) but this topic does not seem to have been covered further by those studying more recent history.

**Science in culture**

Science in culture studies the place of science and scientists in everyday, popular culture, such as general appearance of science stories, or scientific industry coverage in newspapers or radio, science fiction films. It differs from investigations of public understanding of science, which are concerned with scientific literacy and the popularisation of institutionalised scientific research in order to gain support for continued public funding.

Reader describes that entering the chemical industry was considered a poor alternative to the professions and detailed the attempts made by ICI to raise the profile of working in industry through approaching public schools directly.[[48]](#footnote-49) The number of advertisements that ICI placed in The Times directly addressing and re-educating this upper class segment, suggests that the new company were very keen to position themselves as the prominent face of the entire chemical industry. They offered brochures explaining the role of the chemical industry, showcased industry fairs, highlighted economic contributions, as well as the history of chemistry and significance of chemistry in everyday life. This focus on acceptability of the industry, along with the useful, beneficial products it generated, possibly also shines light on the need to rehabilitate chemists and chemistry following the use of poison gases in the Great War.

Chemophobia

Despite these efforts to engage people outside the varied world of the chemical industry, suspicion towards synthetic chemistry has been a serious concern of educationalists recruiting students to chemistry, as well as to those who wanted the acceptance or non acceptance of new chemical products. The term 'chemophobia' was used by Edson, director of the firm Fisons, in the Horizon television programme Pesticides or Posterity in 1964. This indicates that the term has been in use, at least in industry and certainly with this airing of the word on national television, for longer than some researchers have placed it firmly in the 1980s to support the agendas behind PUS. The idea that the word chemical had been 'hijacked' by non-chemists is how John Emsley describes 'chemiphobia'. Another hijacking of a chemical word 'organic' and its application to farming and gardening practices[[49]](#footnote-50) did not help matters between pedantic chemists and non-chemists.

The attitude of chemists toward non-chemists who they deem to be afflicted with this phobia is unfortunate, impatient, arrogant and that it can be fixed through education. Many phobias can be treated through education, but the material produced by chemists for this end tend to be condescending and irritating. Hugh Crone's *Guide to the New Chemical Age* typifies the PUS approach of non-scientists as empty vessels to be filled with knowledge, going as far as suggesting enrolment in a college chemistry course, as well as talking condescendingly and at length about his specialist subject, personal protective equipment and its use in industry (irrelevant for the domestic user of chemicals), while peppering the narrative with supposedly reassuring tables of data and half-remembered anecdotes.[[50]](#footnote-51) Emsley similarly insists that everyone should 'know a little chemistry' and defends chemicals by directing the attention to the user with phrases such as 'the real culprit is not bleach, which has saved millions of lives in its time but ignorance.'[[51]](#footnote-52) and 'often a behaviour is more dangerous than the chemical'.[[52]](#footnote-53) These statements are true but the delivery of either overwhelming amounts of technical information, or of scolding condescension in books that appear to have only reached niche audiences who are already interested in everyday science,[[53]](#footnote-54) for instance New Scientist carried a review as did Science Education Review, probably does not get to the audience who could most benefit by the reassurance that they try to offer.

What efforts like this do not address, because it is hard, are the systems and processes which involve people. Chemicals contained in glassware is one thing, the effect of chemicals out in the rest of the world, on living systems is another. People also complicate chemistry by being human, corruptible, deceptive, and often wrong, so distrust of chemistry is not simply about the chemicals but about the human factors that mediate these products entering the market. Edson tried to address this in his television speech about pesticides when he lamented that 'chemophobia leads everyone to suspect that the sprayers and the chemists who devise or use these chemicals are careless, uneducated, negligent or even wilful poisoners...It is difficult to persuade people that the people who make or use these chemicals aren’t wilful poisoners, they’re clever conscientious, selective poisoners in the service of mankind.' He lamented that 'Nobody loves a poisoner, no matter how you redefine the term.'[[54]](#footnote-55) The issue of poisoning is one that shall be returned to throughout this project.

Chemistry exhibitions

Introduce with more general science exhibitions/museums – mission statements etc, popularisation, then go into chemistry. Can distinguish from nuclear education missions (eg Atoms for Peace train) and penicillin (ask Viviane).

Fairs like “Chemistry at Your Service” and the Festival of Britain were high profile events which celebrated pure and applied science. However, little comment has been made on Chemistry at Your Service, while the assessments and reminiscences of the Festival of Britain, including the Kensington and South Bank Discovery Dome displays, tend to focus on the practicalities and personalities involved in putting the festival together and the lasting impression on visitors of architecture, design and planning, leaving the impact of the science content under-evaluated.[[55]](#footnote-56)

Morris examined how chemistry has been presented to visitors of the Science Museum, London, which has been predominantly about laboratories, either academic or industrial, and being a technology museum, the equipment involved in manufacturing, experimenting and quality control.[[56]](#footnote-57) Similarly, the Secret Life of Home gallery is again concerned with the design and workings of mechanical technologies, rather than the knowledge, practices or products required to care for them, such as cleaning. It could be said that ordingary household chemicals lack visibility in museums, historic houses and reconstructions, when they are not associated with 'firsts', breakthroughs or some other significant. Chemicals that might be found at home are displayed in museums of science and technology, such as the Making of the Modern World Gallery at the Science Museum, but unless they are specialised (pharmaceuticals and dyes for instance) they are not given attention. The durability and attractiveness of pharmaceutical jars can lead to this type of object being preferentially collected, when compared to the throwaway packaging of everyday consumables.

The consumer chemicals presented at the Museum of Brands are presented in room or pantry style displays, or as series showing changes in packaging for one particular products, purely to generate nostalgia for remembered products and a sense of novelty for those not encountered. Museums that explore domestic life also present consumer chemicals, both in the context that they were sold and in where they might be stored or used in the British home. Sometimes, the presence of a producer of a chemical commodity means that a museum local to them will collect representative items, such as the prevalence of Imperial Leather personal care and grooming products at MOSI, in Manchester. Minerals in consumer products are displayed in the Museum of Natural History's Earth gallery. Shop displays such as the pharmacy at the Bridewell Museum, or those at the Museum of London, demonstrate that particular form of retail, as well as the unfamiliar presentation of chemical products, not prepackaged for the consumers convenience. Chemistry sets, as toys for children are again displayed at museums such as the Science Museum or the Children's Museum but with little development or explanation of their interpretation that the chemicals contained within older, extensive sets, were 'dangerous'.

This sense of chemicals as dangerous shapes how museums collect chemicals. The lack of access to affordable, reliable specialist expertise or analytical equipment means that where interesting collections of chemicals are offered in old bottles and jars, perhaps without labels, imbues the chemicals with hazards that an expert would be comfortable in handling. Most museums now collect packaging and dispose of contents, or even avoid collecting, to obviate the difficulty of disposing or keeping these on site, with their potential to be harmful if incorrectly handled, to react in unexpected ways or to off-gas in display cases, and affect other objects. University museums, with the specialist support of academics in the same institution, are more likely to keep laboratory and experimental chemicals.

Newspapers are an important route of delivering information about, and helping to shape attitudes towards, chemicals and the chemical industry. Advertisements, as already discussed, were one method, but features and newsworthy stories featuring chemicals are another. Bingham stresses that newspapers have been underused by historians of the twentieth century, and points out that where they have been used, elite newspapers such as The Times have stood in for newspapers in general.[[57]](#footnote-58) One of the key places that chemicals feature in newspapers, along with stories of scientific progress, medical treatment and catastrophic accidents, is in the reporting of crime. Poisoning, acid attacks and explosions all involve chemicals and in the presentation of victims and perpetrators, inherently carry human interest so are newsworthy. Tunstall highlights that in 1968 crime reporting was classified as having an audience or circulation goal by the papers, and accordingly crime journalism grew. In concert with this, pressure groups and the police developed their public relations efforts in order that their messages were picked up more successfully by the reporters.[[58]](#footnote-59) Note that Tunstall does not include chemical companies or scientists in his list. They do not seem to have been motivated by the negative portrayal of chemicals to try to redress the balance, and in neglecting this opportunity to foster a relationship with reporters by positioning themselves as experts available for comment, contributed to the newspapers conveying a sense of chemophobia, though the fact that in the wrong hands chemicals could be and were used for harm.

Newspaper methodology

There are methodological shortcuts for the historian, such as using digital newspaper resources which can be searched for keywords. This can drastically speed up searches, but can also contribute to those papers with readily accessible electronic copies forming the bulk of the material, The Times is one such paper that most universities have access to, whereas the same facility for lower class dailies such as the Mail, Express and Mirror are possibly available on free trial or only at certain libraries. The loss of context is also keenly felt, especially when the physical organisation of the newspaper is ignored, such as the use of supplements which newspaper readers could remove and never glance at, or neglecting to check where the item appeared in the overall paper. The impressive lists of finds for a keyword, which can be seductively graphed to show support for a thesis, can distort the true use of the word or phrase. Until humanities researchers correctly harness the power of automated sentiment analysis, the results will be necessarily partial.

Product and company advertisements placed in periodicals forms a large part of the material for this thesis, so awareness of the role of advertising revenue and the power relationships between the advertiser and the publication is necessary. During the period under study, paper rationing during and following the second world war meant that the space available for placing adverts, not to mention news stories, was curtailed.[[59]](#footnote-60)

Tunstall describes the advertisements in lower tabloid papers are 'look-at' material, with pictures and big headlines, similar to the rest of the short, quick to read articles that form the rest of the paper. For tabloids, most income is generated through sales through their large readership, so advertisements form a lower percentage of revenue than for broadsheets. Elite papers, bought by a far smaller readership, rely more heavily on advertisements, which are tailored to the upmarket reader.[[60]](#footnote-61) Bingham says that adverts in papers inhibited the investigation of products, although he does not say which products, for what or how they might be investigated.[[61]](#footnote-62) In contrast, Martens and Scott found that Good Housekeeping Magazine did express concerns about the safety of Vapona flykiller strips while continuing to advertise them.[[62]](#footnote-63) Perhaps this was one of the 'prominent issues' that Bingham described as advertising expenditure being unable to suppress.[[63]](#footnote-64)

1. [↑](#footnote-ref-2)
2. [↑](#footnote-ref-3)
3. [↑](#footnote-ref-4)
4. Rebecca Whyte, 2013, PhD thesis Cambridge, unpublished. [↑](#footnote-ref-5)
5. [↑](#footnote-ref-6)
6. Goddard's Long Term, Good Housekeeping, February 1970, p105 [↑](#footnote-ref-7)
7. [↑](#footnote-ref-8)
8. [↑](#footnote-ref-9)
9. Kirchelle, 2014, ch 3, p52 (bit about phage typing, rising outbreaks) DO NOT QUOTE WO PERMISSION [↑](#footnote-ref-10)
10. Zal Disinfectant, Good Housekeeping, June 1975, p8. [↑](#footnote-ref-11)
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