

Cultural and Social History

The Journal of the Social History Society

ISSN: 1478-0038 (Print) 1478-0046 (Online) Journal homepage: <https://www.tandfonline.com/loi/rfcs20>

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To cite this article: James F. Stark & Catherine Stones (2019) Constructing Representations of Germs in the Twentieth Century, *Cultural and Social History*, 16:3, 287-314, DOI: [10.1080/14780038.2019.1585314](https://doi.org/10.1080/14780038.2019.1585314)

To link to this article: <https://doi.org/10.1080/14780038.2019.1585314>



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Published online: 11 Mar 2019.



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Constructing Representations of Germs in the Twentieth Century

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ABSTRACT

The development of germ theories of disease was reliant on the exchange of representations and descriptions of microorganisms. Visual properties were critical in establishing a shared understanding of agents of disease and their causal role. However, historians have yet to explore in detail the representation of microorganisms aimed at audiences beyond specialists. The public visual culture of germs offers a new window through which to understand health campaigns, their motivations, and intended audiences. We argue that still and moving images of germs made visible social anxieties surrounding health, race, class, and national security in ways not yet recognised.

KEYWORDS

Medicine; germs; graphic design; film; public health

Introduction

In 1953, Maria H. Nagy, Putnam Research Fellow at Radcliffe College, Massachusetts, published a follow-up study to her previous work on children's understanding of disease causation.¹ Beginning in 1947, Nagy had set out to ask children from the UK and Hungary between the ages of 3 and 12 two core questions: 'what illnesses have you had ... [and] what makes us ill?'² Children's understanding of the representation of germs proved so pivotal to this that Nagy's subsequent paper in *The Journal of Genetic Psychology* was based on a study which had graphic representation at its heart. Focusing on this occasion on groups from England (Bristol) and the US (Belmont), Nagy staged a series of structured sessions with schoolchildren centred on 'graphic representation of germs and interpretation of the drawings in groups'.³ In order to assess this, children were presented with an invitation: 'You have heard of germs in relation to some illnesses. Would you like to draw some germs?'⁴

The examples of images produced under these conditions (see [Figure 1](#)) provide an insight into perceptions of germs amongst young children in the immediate post-war period. They range from pseudo-animals (number 8) and attempts to recreate images commonly seen down a microscope (6 and 7) to almost entirely abstract dots, patterns and shapes (1, 2 and 5). This plurality of form was accompanied by detailed and highly revealing descriptions of the images. For example, one boy aged 10 explained: 'I have

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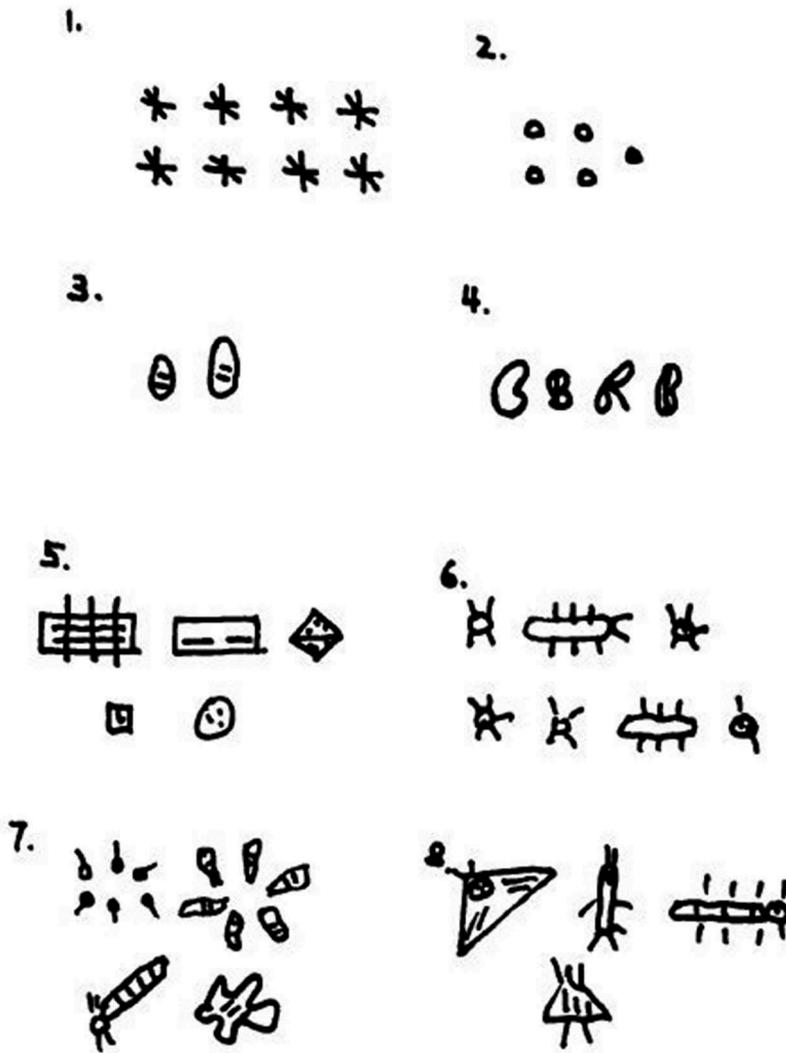


Figure 1. 'Samples of graphic representation' of germs, taken from Nagy's 1953 study.

drawn some germs. The first one is a water spider. The second one is a mosquito. The third one is a kind of flea'.⁵ Nagy noted that in the majority of the interviews, the children identified germs not as a distinctive kind of organism, but as other animals, most frequently insects.⁶

As well as its value to historians of education and present-day educators, Nagy's study also serves to highlight a hitherto neglected area of inquiry at the intersection between histories of science, medicine and design: the popular, and potentially influential, representation of germs. Her work came against the backdrop of increasing ubiquity for the germ image. Whether in school textbooks and hygiene manuals, or Hollywood blockbusters such as *Arrowsmith* (1931, based on Sinclair Lewis's 1925 novel of the same name), encounters with germs in new visual forms became increasingly common during the first half of the twentieth century.⁷ At the same time, bacteriology

itself did not remain a static discipline. The emergence of the sister science of immunology, together with new vaccines, serums and therapeutic formulations such as those derived from bacteriophages served to highlight the diversity of microscopic life and enhance the perception that it represented a complete ecosystem in miniature, complete with various anthropomorphic tendencies.⁸

Whilst debate about the authenticity and objectivity of images within and between various scientific disciplines, including the biomedical sciences, has occupied a central place in recent historiography – especially in the work of Lorraine Daston and Peter Galison, Jennifer Tucker and Nick Hopwood, amongst many others – analysis of images and imagery at the interface between the scientific and the popular has been far less prevalent.⁹ In the case of germs, it is almost entirely lacking, save for occasional mentions with reference to the nineteenth century context in the United States in Nancy Tomes' *The Gospel of Germs*.¹⁰ Tomes argues that representations – but not necessarily specifically of germs – were a critical part of a two-way process of 'popularization ... where ideas and images are traded among different audiences, including laboratory scientists, practicing physicians, hygiene reformers, and interested lay people'.¹¹ More abstract representations of diseases were, as Tomes argues, mobilised in public health campaigns such as those initiated by the Illinois Tuberculosis Association during the First World War, which issued posters showing 'a skeleton astride a giant fly, dropping bombs with the names of infectious diseases on the people below'.¹² In the early twentieth century, with germ theories of disease in the ascendancy and a rapid expansion in direct-to-consumer advertising for sanitary products, also acknowledged elsewhere by Tomes, it is striking to note that historians are yet to fully engage with the different forms of germ representations.¹³

In this paper we address this lacuna and set out to provide an account of the changing representation of germs in British print and film media during the middle part of the twentieth century.¹⁴ The argument is structured around two distinct case studies, which highlight the significance of different modes of representation, socio-cultural contexts and communicative purposes. Taken together, these provide a starting point for the broader interrogation of germ imagery in both other cultural and geographic contexts as well as in more recent historical periods. The first focuses on filmic germ representations in the period 1927–1935, concentrating in particular on three surviving films from a series of four, featuring 'Giro the Germ', issued by the Health and Cleanliness Council, and *See How They Won*, a 1935 promotional film for the retail pharmacy company Boots. The second examines the public health posters produced by the British graphic designers and cartoonists, including H. M. Bateman, Eileen Evans and Reginald Mount, and Philip Mendoza, for the Central Office of Information and Ministry during the Second World War and through into the 1960s. Whilst these have attracted some attention from historians, including an influential chapter by Roger Cooter and Claudia Stein, our focus on germs and their significance enables us to move beyond the materials themselves to uncover attitudes towards and understanding of infection, hygiene, personal responsibility and gender dynamics.¹⁵

As Martina King has summarised, 'scholarly work on the "politics of bacteriology" has made it evident that the longstanding stereotype of the evil, menacing, invading, anthropomorphic germ in the 20th and 21st centuries originates around 1900'.¹⁶ Whilst the status of German bacteriologists as 'microbe hunters' around this period might

explain the emergence of such a phenomenon, a number of key questions remain outstanding.¹⁷ How did the stylised representation of germs change through the twentieth century? What function did these still and moving images serve? And what does the context of production of these artefacts tell us about wider understandings of the microscopic world, science and disease causation? These are the central motivating questions, but analysis of a still broader range of source materials – not possible within the confines of this paper – will be necessary to provide more complete answers. What we highlight here is the potential inherent in a fully contextualised analysis of these images. This is an approach which can serve as the basis for the historian of science and medicine, design and twentieth century British society to explore in new ways the construction of illness, disease, healthcare and social structure.

We argue that the production and consumption of these germ images paradoxically reveals an important ongoing presence for pre-germ theories of disease, particularly focused on miasmas and contagion. The home, workplace and wider public environment were cast in many cases as ostensibly clean spaces which were nevertheless teeming with microscopic, virulent life, anthropomorphised to ascribe agency, intent and character to germs in the service of education, commerce and public health. In this respect, both the environmental context and disease vectors came to occupy a critical position in the visual language of infectivity, mirroring parallel public health campaigns against carrier organisms such as mosquitos and other pests. In many cases, the presence of germs was actually implied rather than made explicit, demonstrating that the same communicative strategies underpinned posters warning of the dangers of malaria, yellow and dengue fevers, and other diseases where the vector – not the pathogen – was the major focal point.¹⁸ The imagery of vectors, pests and germs therefore developed in parallel. In both cases, however, personal responsibility was represented as critical in mitigating the presence of these opportunistic predators, whilst corporate healthcare interests and the medical profession stood ready to come to the aid of those negligent of their hygienic duties. Germ images drew on prevailing cultural traits, from flapper dancing during the 1920s to the embodiment of foreign invaders in the context of wartime, all the while characterising the body and its environment as a battleground against infectious microorganisms, reimagined visually without deferring to the archetypal technology of bacterial visualisation: the microscope.

Germ on film: the moving microbe in context

‘Give no quarter, make no terms,
Rid the place of Giro germs!’¹⁹

For an organisation which produced such a wide range of public health education and promotion materials – posters, films, textbooks, plays and pamphlets – the Health and Cleanliness Council (HCC) has been curiously neglected by historians of all stripes. Virginia Smith describes it as one of several ‘semi-public bodies’ with a remit for matters of public health promotion, established in 1928.²⁰ However, we know for certain that the HCC was active as least as early as 1926 – the year of one of their earliest poster exhibits.²¹ The organisation was headquartered in Tavistock Square,

London, and its activities were aimed principally at fostering cultures of everyday hygiene amongst schoolchildren; the broader primary objective of the Council was 'the education of the people in matters of health and cleanliness'.²² However, they also attended health exhibitions and produced books such as *The New Home: A Handbook for New Tenants* and *Hints for the Busy Housewife* with the express intention of creating a home which 'trains children to the ... proper way of life and living' and making 'housework no longer a depressing labour but an interesting and pleasant duty', respectively.²³ The HCC, which included the BMA Council member G. F. Buchan as its first President and Chairman, acted in parallel with the Central Council for Health Education, a body formed a year earlier in 1927, which had a more formal basis in public medical life and, in 1946, took over distribution of the HCC's publications following the body's demise.²⁴ Financial support came principally from two sources: the electrical and soap industries.²⁵ This backing can be seen clearly in the advocacy for domestic electrical technologies, including lighting, and soapy water as a cleansing fluid par excellence.²⁶ The influence of these two major corporate interests can be seen more clearly in the later work of the Council; for example, in an address at a major meeting of the HCC in 1934, Buchan 'urged that houses should be so constructed that they could readily kept clean, and that there should be increased facilities for the use of electricity at cheap rates for labour saving and other purposes in the home'.²⁷

The texts produced by the HCC were distributed by existing formal public health infrastructure and reached huge audiences. A report in *The Lancet* noted that in 1928 the HCC issued 'some 5,000,000 of its various booklets and leaflets to 2300 districts in England and Wales'.²⁸ For example, in 1938, the Medical Officer of Health for Cardiff (Union) noted that '[o]ver 5,000 copies of the Health and Cleanliness Council's booklets "Keep Fit" (for boys) and "Health and Beauty" (for girls) were supplied ... for distribution amongst Juveniles', whilst '[c]opies of the booklets "The New Home" and "Hints for Busy Housewives" ... were given to all practising midwives for distribution amongst their patients'.²⁹ Other texts aimed at teachers also reproduced HCC posters.³⁰ For our purposes, however, the promotional material produced by the HCC included a strong emphasis on visual representations of hygiene practices, dirt and germs. For example, in the mid-1930s, as part of a pioneering collaboration with the noted British graphic designers, Dorothy Braddell and Abram Games, the HCC devised a simple message for their posters which concretised the relationship between cleanliness and germs: 'where there's dirt there's danger'.³¹ This slogan underpinned much of the public health imagery which sat at the heart of the HCC's activities.³²

As well as these posters, the HCC also commissioned a series of four films featuring 'Giro the Germ' between 1927 and 1935, all produced by Newhall Films.³³ The first – *Giro the Germ* – was made in June 1927, with a further instalment the same year – *Giro the Germ Episode 2*. These were followed by *Giro – Fast and Loose* and *Giro and his Enemies* in 1935.³⁴ In *Giro the Germ*, we first encounter the eponymous Giro, depicted as a dark, hooded, human-like figure with a tail, in one of his 'homes' – a bin – hitching a ride on his 'taxi' – a fly. The short film, just over eight minutes in length, follows Giro and his fellow germs as they search proactively for people to infect.

'See where Giro's going,
flying thro' the air?
Where there's dirt there's Giro
and danger everywhere!'³⁵

Although the title suggested that Giro was a singular figure, he is accompanied almost throughout the film with other identical germs, emphasising the group mentality of infectious agents. This mirrored the concept of a bacterial colony, and characterised germs as plotting, scheming and opportunistic. For example, as a Giro lands on the windowsill of a house, he waves his hands in frustration because 'this is a clean house', protected against invading germs. In contrast:

'If your house is dirty
and the house-fly comes and sees.
He will bring the Giros
- they will bring disease!'³⁶

The implications are quite clear: flies are the vectors of disease transmission, although not causation, and keeping a clean house is the most certain way of avoiding infection. Having moved on to fresh pastures (see [Figure 2](#)), the Giros come across a more receptive – dirtier – environment, and are dropped to all areas of the house by the flies:

'GIROS on the table,
GIROS on the stair,
GIROS in the pantry,
GIROS *everywhere*'.³⁷

The occupants of the house – 'Grimy' and his wife – soon ingest the Giros, Grimy from his dirty hands, and his wife through her tea, and immediately begin to feel unwell. Their situation is remedied shortly afterwards after the arrival of 'the wise old Doctor-



Figure 2. Germs, represented as Giro, celebrate finding an insanitary household by skipping over one another's tails (Giro the Germ, 4:02).

man', who declares that 'It's Giro's made you ill today!'³⁸ The insanitary couple are instructed to 'go and cover the dustbin properly' and 'scrub the whole house'.³⁹ As they do so, the germs are caught up in waves of soap and water, and the film closes with the image of a Giro lying dead in front of a tombstone which bears the inscription 'Giro Germ'.

The early Giro films employed the relatively new technique of rotoscoping – an animation technique developed by Max Fleischer in the early 1920s to trace over live-action film and produce life-like cartoon images.⁴⁰ These allowed the HCC to produce animations which imbued the Giros with realistic human movement; the figures' dancing reflected the characteristic flapper style of the 1920s.⁴¹ The three episodes from 1927 were all of relatively similar character, highlighting germs as enterprising and sinister organisms, with intent to harm. However, by the time that Giro returned in *Giro – Fast and Loose* and *Giro and his Enemies* (both 1935), the films had taken on a rather different tone.

In *Giro – Fast and Loose*, which featured both music and narration, largely in place of intertitles, we find Giro, recast as a criminal, imprisoned – 'kept out of mischief by bars of soap' and the power of electricity (see [Figure 3](#)).⁴²

'Giro the germ is invading our city,
Giro the germ is a foe without pity.
Oh, Doctor, please hurry, the sickness and worry
and panic is spreading all over the town'.⁴³

The film contained numerous references to modernity, from the electric vacuum cleaner and electrified cell for Giro, to exhortations for citizens to clean themselves and their homes 'in the most modern way'.⁴⁴ Grimy and his wife are replaced by 'Slackey the sloucher', who spreads his complacent attitude towards cleanliness to others. After falling ill, the overwhelmed doctor identifies Giro and his accomplices as the cause; they are recaptured and returned to prison.



Figure 3. A re-imagined Giro from 1935, now with more stereotypically cartoonish facial features, and markedly less sinister (*Giro – Fast and Loose*, 1:06).

No copies of *Giro and his Enemies* survive, but a short synopsis from the *Monthly Film Bulletin* around its release describes a narrative which acts as a prelude to the events of *Giro – Fast and Loose*. In *Giro and his Enemies*, the cartoon germs attempt to infect the residents of Healthville, and are ultimately thwarted by the ‘forces of household hygiene’.⁴⁵ The overall message in both of these 1935 films was one of caution; even though germs might be kept at bay by the judicious application of the powerful domestic servants of electricity and soap, a slackening of such habits would instantly allow germs to resume their place as all-pervasive disease-causing agents. In contrast to the final and decisive soapy victory over Giro depicted in earlier films, the emphasis was now on maintaining superiority; a situation which might be easily disrupted by even one failure to follow the basic rules of hygiene and sanitation.

The films were shown widely across the UK from 1927, particularly during regionally organised, but nationally promoted Empire Health Weeks when Giro featured alongside other films related to health and hygiene such as *The Body’s Deadly Foes* and *Dr Wise and Influenza*, often with accompanying lectures and poster exhibitions.⁴⁶ The original films from 1927 had significant longevity, providing an explanation as to why the HCC decided against commissioning any additional films for a period of eight years. Local press reports confirm that the film was shown across Britain at regular intervals between 1927 and 1938.⁴⁷ On 17 November 1929, for example, the Scala Picture Theatre in Rugby hosted a screening of both *Health and Cleanliness* and *Giro the Germ*, introduced by the HCC representative Dr Elizabeth M. Foley Taylor.⁴⁸ By 1937, the HCC had secured status for their work from the highest authority, when Neville Chamberlain inaugurated their National Health Education Campaign.⁴⁹ Even as late as 1941, the travelling ‘Van of Health’ picture show visited war shelters in London, showing *Giro the Germ* and dovetailing with wartime public health campaigns to preserve cleanliness in the service of national security.⁵⁰

In keeping with the Health and Cleanliness Council’s principal object – health education for the young – the films were targeted primarily at a school age audience and purposefully shown in both education institutions and to other groups of children including guides, brownies and juvenile offenders.⁵¹ A report on the health campaign in Derby in June 1930, for example, noted that the films were shown to children of ten and upwards ‘but it hoped to increase the number this year and include all children of eight and over’.⁵² These showings were part of an organised public health campaign in the wider county of Derbyshire and, critically, the public health message of the Giro films relied on cooperation of cinema managers who scheduled showings as part of their regular offering.⁵³ The 1920s Giro films reached a large as well as broad audience. For example, during Oldham’s Health Week in 1928, 1200 schoolchildren were reported to have seen *Giro the Germ*.⁵⁴ A local newspaper noted that at a similar event in Derby two years later, over 40,000 children were likely to have seen the films, which included *Giro the Germ*.⁵⁵ The film did not, of course, exist in isolation. In addition, the HCC also distributed 50,000 bookmarks, featuring their slogan ‘where there’s dirt, there’s danger’, but also integrating health messages into the practice of reading books itself by encouraging children to ‘read wisely ... read often ... [and] read cleanly’.⁵⁶

Local Health Weeks – one of the key contexts in which contemporary audiences would have encountered the Giro films – featured many other activities for children and repetition of practical everyday action which they might take in the service of

cleanliness and hygiene. For example, the Devon Health Week of 1927 involved a wide range of poster exhibitions and film showings – including *Giro the Germ*. The whole event exhorted young people to ‘fight the many demons who cooperate in spreading ill-health and disease tooth and nail’, focusing on habits such as handwashing, killing vectors of disease transmission such as flies and avoiding sneezing and spitting.⁵⁷ The notion that hygiene could be habitual from a young age was especially pervasive in popular reports at the time. As part of his promotion of Health Week in 1930, Dr. Hamilton Wood, the County Medical Officer of Health for Warwickshire, stated that ‘[w]e try to teach people to be cleaner and healthier in their habits, and the children are being taught in the schools so that they will grow up into healthier men and women’.⁵⁸

Given the informal nature of many showings of these films, the reconstruction of audience responses presents a particular challenge to the historian. However, almost all contemporary reports of the showings of Giro films noted the importance of humour in communicating critical messages about maintaining domestic cleanliness and health. For example, *Giro the Germ* was shown at a lecture organised by the Central Council for Health Education in Rugby in November 1929. A report in the local press noted that the film was ‘an amusing presentation of the habits of dirt produced germs’ which ‘emphasised the mortality caused to these health destructors by a plentiful use of soap and water’.⁵⁹ Commenting on a showing at Belfast Museum for trainees at the Juvenile Instruction Centre and Malone Training Centre, the *Northern Whig* described it as a ‘humorous film intended to convey the important part played by germs in the spread of infectious disease’.⁶⁰ When included as part of the Scientific Exhibition at Bath in April 1931, the local press highlighted the opening showing of *Giro the Germ*, which ‘amuse[d] children and adults alike’.⁶¹ Members of the HCC were themselves frequently present at such events, providing educational lectures for young audiences to accompany film showings.⁶² Most contemporary commentators agreed that the humorous elements of the Giro films heightened their appeal to younger audiences, although Councillor Parke of the Warwickshire County Council objected to the awarding of a grant to the British Social Hygiene Council, whose syllabus included *Giro the Germ* (‘quite a friendly name for the germ’, Parke is supposed to have complained).⁶³ The HCC also devised a more interactive strategy for promoting hygienic habits amongst children, to supplement their films and poster campaigns. These were a series of plays which included *The Terrible Twins*, *The Giant Killer* and *Judy’s Dream*. Published through the early 1930s, these constituted what *The Woman Teacher* periodical described as ‘Cleanliness Propaganda’.⁶⁴ Of the series, *The Defeat of the Germs* provides perhaps the most striking confirmation that the anthropomorphisation of germs in the interwar period was not restricted to the medium of film. Written by children’s author Zillah Walthew, *The Defeat of the Germs* (1936) featured a contrast between eleven healthy children – six girls, five boys – and a single ‘Naughty Boy’, who refuses to join in with hygienic practices such as washing hands, brushing teeth and brushing hair.⁶⁵ Meanwhile the germs, also played by children identify the Naughty Boy; they ‘dance round him – getting fiercer and fiercer’ – while in the following scene he is ill in bed, surrounded by the germs.⁶⁶ At the behest of the Doctor, aided by the Nurse, the Naughty Boy is thoroughly scrubbed and a group of Fairies, representing health and hygiene, usher the germs away. At the close, tellingly, the ‘DOCTOR enters and is hailed and pulled forward’.⁶⁷ Those choosing to stage the play were reminded that the

HCC could 'supply posters to decorate the hall during the performance of this play, also attractive booklets for distribution'.⁶⁸ This meta-communication – demonstrating significant interplay between the strands of HCC activity – can also be seen through the placement of HCC posters in the background of their film *Ten Dirty Little Boys* (1929).⁶⁹ The racial dimension clearly present in *Ten Dirty Little Boys*, as the black figures are equated with both moral and hygienic uncleanness, was also visible in *Giro*, himself a black character who infiltrated homes to spread disease. These mirrored significant anxieties about the much-studied infectivity of other races, with germs acting in an analogous fashion to other, human, bodies.⁷⁰

If corporate interests manifested in a more subtle way through the *Giro* film series, then there was a rather more obvious tone of the marketplace to some other animations which represented germs graphically. An especially noteworthy examples is *See How They Won*, a six-minute short colour film produced by Revelation Films and Celebrity Productions for Boots, the retail pharmacy and chemist firm. *See How They Won* was a collaboration between British artists and Hollywood animators, led by the noted American cartoonist Ub Iwerks.⁷¹ The film depicted the opportunistic exploitation of the home of John Careless by a well-drilled and highly disciplined army of germs – including Brigadier Blood-poison, Flight Commander 'fluenza, and Captain Sore Throat' – who infect the entire family before being vanquished by the 'Good Health Army'.⁷² Whereas the figure of *Giro* was quite clearly an infectious agent himself, the identity of the germs was considerably more pluralistic in *See How They Won*, with figures supposedly part of the 'germ army' in fact pouring germs out of buckets and firing them from cannons to cause infection.⁷³ Having been driven back, the airborne forces of the Good Health Army destroy the germs' castle and stage a march-past, cheered on by the Careless family.⁷⁴

The three types of germs visualised in this film, and accompanying ephemera, present a novel analogous framework for representing multifaceted and dangerous germ agency. The germ army generals (themselves labelled as diseases or symptoms) colluded and plotted invasions. They were uniformed in military garb sporting distinctive facial features and sullen or ruddy complexions. They were served by a germ army of identical figures that physically spread the germs. The germs themselves more closely resembled personified insects or microbes in diverse forms. An audience then might perhaps have understood that all three character types posed a distinct, direct, albeit dramatised and exaggerated, threat to health. By implication, this systematic and organised invasion demanded the best medical protection to ensure defeat, provided in this case, only by Boots. By creating three germ tropes the producers could ensure a series of dramatic narrative sequences within the animation.

The film was part of a concerted campaign to promote local Boots pharmacy branches as a way of combatting everyday illness and disease in the home, yet the commercial message was not regarded by contemporary observers as a detriment. According to a commentary on cartoons in the service of public health published in *The Lancet*, *See How They Won* confirmed that 'when there is anything that can usefully be said to the public on health matters the cartoon can be made an effective way of saying [it]'.⁷⁵ Local press reports noted that '[t]he film is excellent of its type, for the actual name of the firm [Boots] is only introduced at the end', demonstrating a sympathy for the preservation of the integrity of the film and its message.⁷⁶ In addition

to the film itself, which was shown in at least 700 picture houses during the winter of 1935–1936, often in conjunction with major releases such as *The Scarlet Pimpernel*, Boots produced a promotional booklet retelling ‘the story of John Careless and his family (based on the Coloured Comedy Cartoon Film of the same name)’.⁷⁷ With artwork created by the same team behind the film, the distinction between the germ army and the germs themselves is quite clear (see Figure 4).

To supplement these more established modes of consumer persuasion, Boots also issued a board game – ‘See How They Won: The Game of Good Health’ – given out free to customers. Featuring the same imagery and characters, players had to chart a passage to the Land of Good Health, their progress accelerated by taking aspirin and landing on Boots stores, hindered by chills, colds, ‘flu’ and ‘feeling fagged’.⁷⁸ On the reverse side of the board, players were encouraged to ensure their own health by taking various proprietary and own-brand medications, including ‘Dr Armstrong’s Tonic’, ‘Boots Extract of Malt’, ‘Regesan Cold Cure Tablets’ and ‘Boots Glycerin of Thymol’.⁷⁹

The veneration of the medical professional and products was visible in the campaigns of both Boots and the HCC. Further, the attribution of intentionality and cunning to germs was another hallmark of multiple forms of health and hygiene education distributed by the HCC. This was very much in keeping with other promotional materials from the early 1930s which encouraged sanitary habits. In

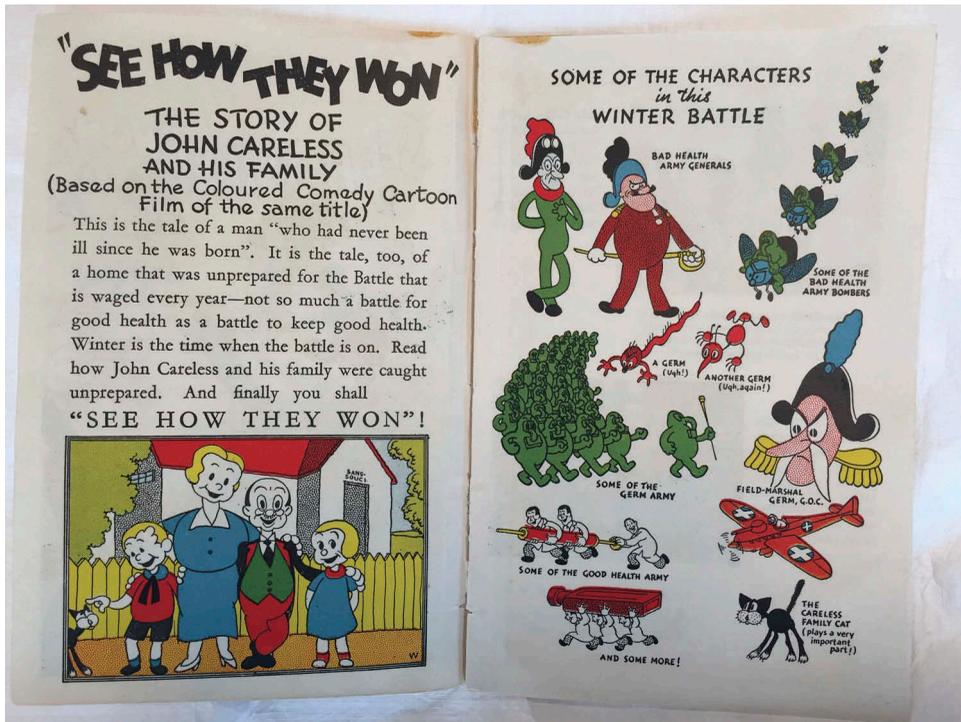


Figure 4. Key protagonists from *See How They Won*, with the representations of germs including the two red figures in the centre. These are deployed in the film by members of the germ army, overseen by the ‘Bad Health Army Generals’, led by Field-Marshal Germ. (‘Our Winter Health Campaign Booklet’, 1935, n.p.).

an advertising pamphlet for Genatosan, for example, readers were warned a microbe might be bent on ‘taking advantage of your hospitality’.⁸⁰ At the same time, in his popular book, *Man and Microbes*, Stanhope Bayne-Jones – Professor of Bacteriology at the University of Rochester – noted that ‘the germs of tuberculosis or syphilis, enter [the body] stealthily’; they ‘set up their breeding ground in the intestine, tear it more or less to pieces, and poison the whole system’.⁸¹ The theme was echoed in commercial advertising materials; for example, an advert for Bengue’s Balsam from the 1930s, printed on blotting paper, warned that germs were ‘waiting to catch anybody who does not protect himself...’.⁸²

In one of few historical accounts which has specifically considered the *Giro* series of films, Rachel Low has characterised *Giro* as ‘an evil little black character’, describing the animation as ‘crude, with many passages repeated for the sake of economy, and the lesson was contained in a jingle which appeared as titles in the silent version or was sung in the sound version’.⁸³ However, when we place the imagery of *Giro* and *See How They Won* in the wider context of the interwar period, three deeper features of the film emerge as especially significant, considering the key points of difference between the earlier and later films.

First, there was a conscious decision to represent germs as active agents of disease, present only in certain environments, and carried by an easily recognisable vector: the fly. This gave a clear visual message about the importance of domestic hygiene practices, emphasising personal responsibility and the dangers of failing to take duties of cleanliness seriously. Second, by choosing to represent germ movements in such a self-evidently human way, the films drew explicit comparisons between the slovenly and ignorant (Mr Grimy, John Careless and Slackey the sloucher) and the virtuous and knowledgeable (the doctor, public health officials and Good Health Army). The germs were opportunistic and in many ways represented immoral tendencies; their visual congruency with the devil is unmistakable, particularly in the earlier episodes. This is especially relevant when we consider that the ‘necessity of cleanliness of mind ... was the true message of the Health and Cleanliness Council’.⁸⁴ Third, the mobilisation of technology – represented visually as animated light bulbs and bars of soap in *Giro – Fast and Loose* – was an increasingly important aspect of the battle against infection, whilst the metaphor of conflict, which we know played a critical role in public health messages during both the First and Second World Wars, was similarly evident during peacetime campaigns such as these.

Whether on film, posters or ephemeral advertising materials, the dominant mode of representation in the interwar period saw germs identified with small creatures imbued with intent. We turn now to the established medium of the public health poster, the circulation of which was rapidly expanded during World War Two in the service of both emerging anxieties of national security and long-standing concerns about public and domestic hygiene practices, as well as in much-studied and more specific service such as containment of venereal disease.⁸⁵

Germs, the enemy: visualising agents of infection

The phrase ‘coughs and sneezes spread diseases’ has been a consistent presence in British public health campaigns for well over half a century. First introduced in an effort

to combat absenteeism during the early 1940s, the slogan has been associated with a wide range of designers, images and subjects. By 1945, it was firmly anchored in public health architecture, and some public health officials even put forward proposals to extend the same idea to preventive campaigns aimed at reducing the spread of specific conditions such as TB.⁸⁶ The effectiveness of the measures was now taken as obvious; as the Medical Officer of Health for Barking noted in his 1945 report, '[i]t is true one hundred per cent, that coughs and sneezes spread diseases'.⁸⁷

The posters which first used the slogan were designed by the noted cartoonist H. M. Bateman, whose work had been published extensively in *Punch* and other high-profile periodicals.⁸⁸ The Ministry of Health had already worked extensively to promote public health through the Central Council for Health Education, which also included representatives from the Department of Education, Medical Officers of Health and groups of medical professionals and educators.⁸⁹ In the original poster campaigns of 1941–1942, Bateman's images were used to demonstrate the importance of hygienic practices for the war effort. For example, posters showed a female munitions worker, another in a shop and one in a railway carriage (Figure 5), a man in a canteen queue, and another in a crowded public place, all sneezing without using a handkerchief and attracting universal admonishment from those around them.⁹⁰ As well as 'coughs and sneezes spread diseases', those who encountered these posters were instructed to 'trap the germs in your handkerchief [to] help keep the nation fighting fit'.⁹¹

Bateman's representations showed clearly the rapid expulsion of nasal mucus on sneezing; however, unlike the films discussed earlier, germs themselves were not visible. Instead, the presence of germs was implicit. Although the Ministry employed Bateman to produce the original wartime images, the approach persisted for far longer. For example, in 1944, they approached Keith Monk to update the existing Bateman images.⁹² Monk seemingly only produced a single graphic as part of the campaign, and little is known about his other work, but he adopted the same approach to germs as Bateman – shunning images of the germs themselves in favour of a focus on sneezing as a medium of germ transmission. The Bateman and Monk images established the relationship between sneezing and infection, mediated by invisible germs; it was left to accompanying text to remind public audiences that these microscope organisms were the ultimate object of such public health interventions.

In contrast, other images highlighting more specific aspects of infection control drew on historic metaphors of conflict to depict germs as synonymous with invading fascist forces. In an almost exact mirror of the relationship between the Ministry of Health and the Central Cleanliness Council, The Ministry of Labour, in an effort to preserve workers' health (and therefore productivity), issued a series of posters in collaboration with the National Safety First Association.⁹³ These were produced no later than 1941, when the NSFA was renamed the Royal Society for the Prevention of Accidents (RoSPA), and drew on narrative images produced by another illustrator who learned his trade as a street artist and newspaper cartoonist, Philip Mendoza.⁹⁴ Mendoza (1898–1973) worked with both the NSFA and RSPCA; for the latter, he created the comic character Percy Vere to raise awareness about the danger of industrial accidents.⁹⁵ The two posters which Mendoza produced for the NSFA highlighted the importance of swift first aid for cuts, and the alacrity with which the invading germs – 'germs love an open wound!' – exploited the opportunity to infect through the skin. Led by a germ-likeness of Hitler, the germs themselves were

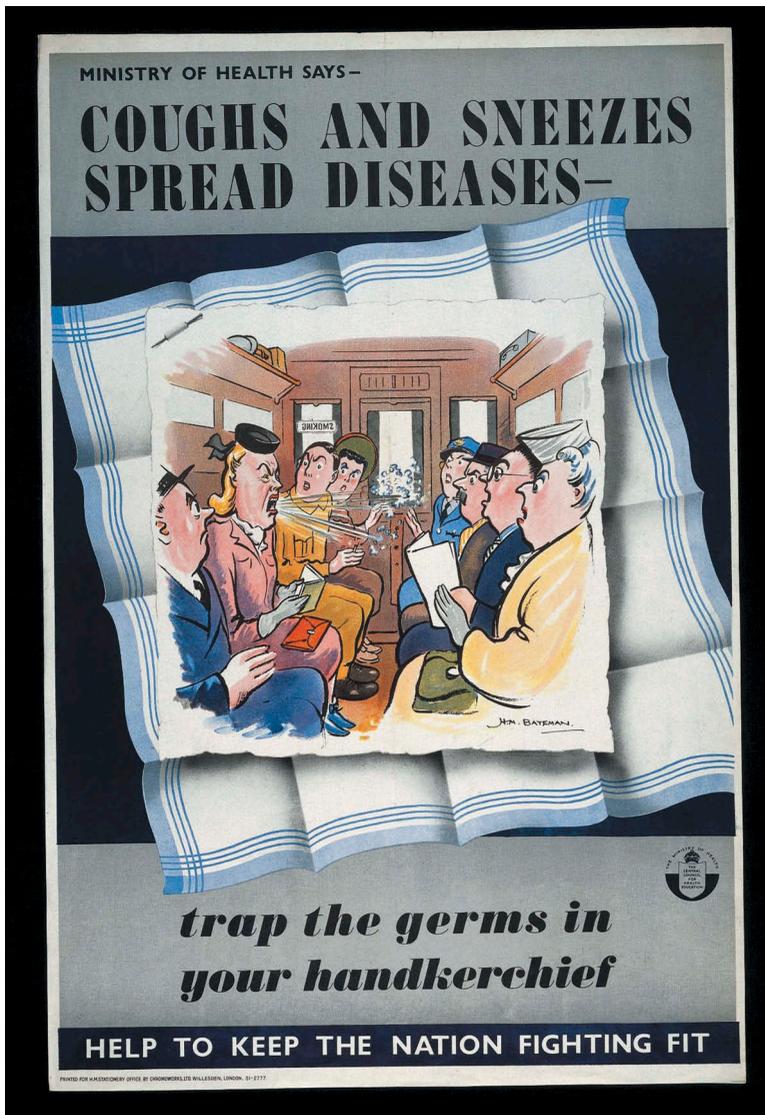


Figure 5. An example poster which made use of illustration by H. M. Bateman. Much like earlier images, the emphasis on personal duty and social responsibility underscored the core message – to use a handkerchief to stop the spread of germs and preserve national fitness. ('A woman coughing in a railway carriage. Lithograph after H.M. Bateman'. London: HMSO, c.1942, 22641i, Wellcome Library.)

a curious hybrid between a Giro-like figure and a horned-insect (see [Figure 6](#)). The image itself was incredibly rich, depicting the germs parachuting onto a cut forearm, aided by 'fifth column and defeatist germs co-operating with the enemy, descending from the sky to shouts of 'Sieg Heil!''⁹⁶

Mendoza also reimagined the conflict between germ and body as one waged between invading German forces and 'White Corpuscles (or Home Guard)' who mobilised antiseptic ('munitions, ordnance etc.') and dressing, which 'covers the breach and prevents reinforcements from reaching the enemy'.⁹⁷ Exhibiting considerable artistic

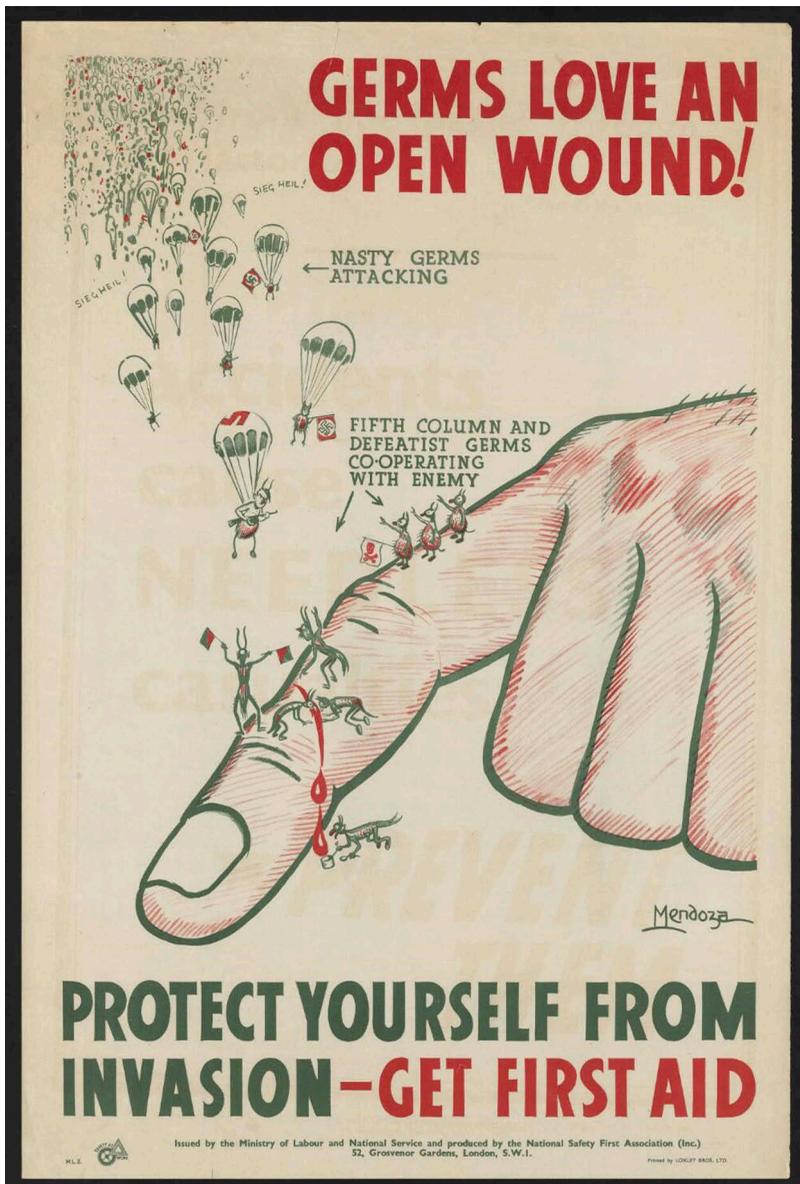


Figure 6. Germs, clearly resembling the forces of fascist Germany, descending to infect a wounded figure. This iconography drew heavily of pre-existing modes of representation, and there are clear resonances with earlier representations of germs in both the Giro films and *See How They Won*. ('A finger-wound being attacked by germs represented by German soldiers in World War II. Colour lithograph after P. Mendoza', 1940, 680216i, Wellcome Library.).

license, Mendoza represented the immune system through quasi-toy hussars who mobilised a cannon in their defence, whilst the attacking German troops are unmistakably attired like contemporary soldiers.⁹⁸

By the latter stages of the War, the then-renamed RoSPA commissioned similarly nationalistic images likening the invasive tendencies of germs to that of the German

army. In contrast to the anthropomorphic tendencies of Mendoza, H. A. Rothholz (1919–2000), a German-born graphic artist who, with colleagues Abram Games and Tom Eckersley, played a key role in defining British graphic design for the mid-twentieth century, favoured a more immediate presentational style.⁹⁹ The Rothholz poster from around 1943 drew on the iconography of the Third Reich, employing the swastika and typefaces explicitly associated with the regime.¹⁰⁰ As a German national, many biographies note that Rothholz was interned – in Liverpool, Canada and the Isle of Man – for early parts of the War. However, we know that as early as 1940 he produced a poster for the Ministry of Labour and National Service, and in the summer of 1942 received a letter from the RoSPA, who expressed admiration for his work.¹⁰¹

The still images, drawing on cartoon style but rooted in simple public health messaging, were also supplemented in the immediate post-war period by a series of iconic films which simultaneously emphasised the message that ‘coughs and sneezes spread diseases’ but also showed how ubiquitous it had become. These included *Coughs and Sneezes* (1945), *Influenza* (1946), *Modern Guide to Health* (1947) and *Jet-propelled Germs* (1948), all of which starred and were directed by Richard Massingham (1898–1953).¹⁰² In these, germs were not visualised, but rather taken for granted, and the message of catching a sneeze in a handkerchief was one, even for Massingham’s well-meaning but bumbling character, which had become assumed knowledge by the end of the tetralogy.¹⁰³ At the close of this one-minute miniature, shown in cinemas around Britain, the simple message in the commentary – ‘Got it? Sure? Good! Remember; Don’t spread Germs’ – reinforced the importance of not only using a handkerchief, but disinfecting it regularly.¹⁰⁴ When commissioning *Jet-propelled Germs*, the Ministry of Health wrote to Massingham’s production company – Public Relationship Films Ltd. – outlining the two central messages. According to the commission, the film should communicate the following two points:

[First], keep your cold to yourself by sneezing into your handkerchief; [second], remember your handkerchief is then pretty septic, and put it in the bowl of disinfectant and not in the family dirty clothes-basket. The principal emphasis should be on the second rather than on the first point, which is by now more familiar.¹⁰⁵

The development of germ imagery in the immediate post-war period continued to emphasise the close relationship between insanitary habits and the presence of infectious agents. The Ministry of Health first commissioned images from the celebrated cartoonist Giles (Ronald Giles, 1916–1995) to illustrate a reboot of the posters in the late 1940s. Giles, like Mendoza, had made his name as a newspaper caricaturist from the late 1930s, first with *Reynolds News* and then *The Express*.¹⁰⁶ His contributions marked a return on the figure of the anthropomorphic germ, emerging from droplets of mucus to veer round and eyeball a co-worker. There was an implicit reference to masculine attitudes towards protection in the image, reflecting earlier male resistance to workplace health measures, stretching back to nineteenth century occupational health reforms.¹⁰⁷ The mock-ups for the first Giles poster (see [Figure 7](#)) were produced no later than 1946, using the same slogans as the original Bateman designs – ‘coughs and sneezes spread diseases’ and ‘trap the germs in your handkerchief’.¹⁰⁸

Following the end of hostilities, the Ministry of Health determined that the focus on sneezing in public had a profound impact on public health. They decided to retain the

slogan, together with the close connection between the act of sneezing and the presence of infectious germs, but pursued collaborations with other artists who increasingly opted to retain germs as a hidden aspect of public health. As well as further commissions from Giles in the late 1940s, the Ministry and their collaborators at the Central Office of Information also explored collaborations with the relatively unknown figure of Allan Clark.¹⁰⁹ However, from the 1950s, the imagery of the posters took a striking turn with the involvement of Reginald Mount and Eileen Evans, whose public information posters during the Second World War had addressed a wide range of themes, from the 'dig for victory' campaign to the much-studied series on the subject of venereal

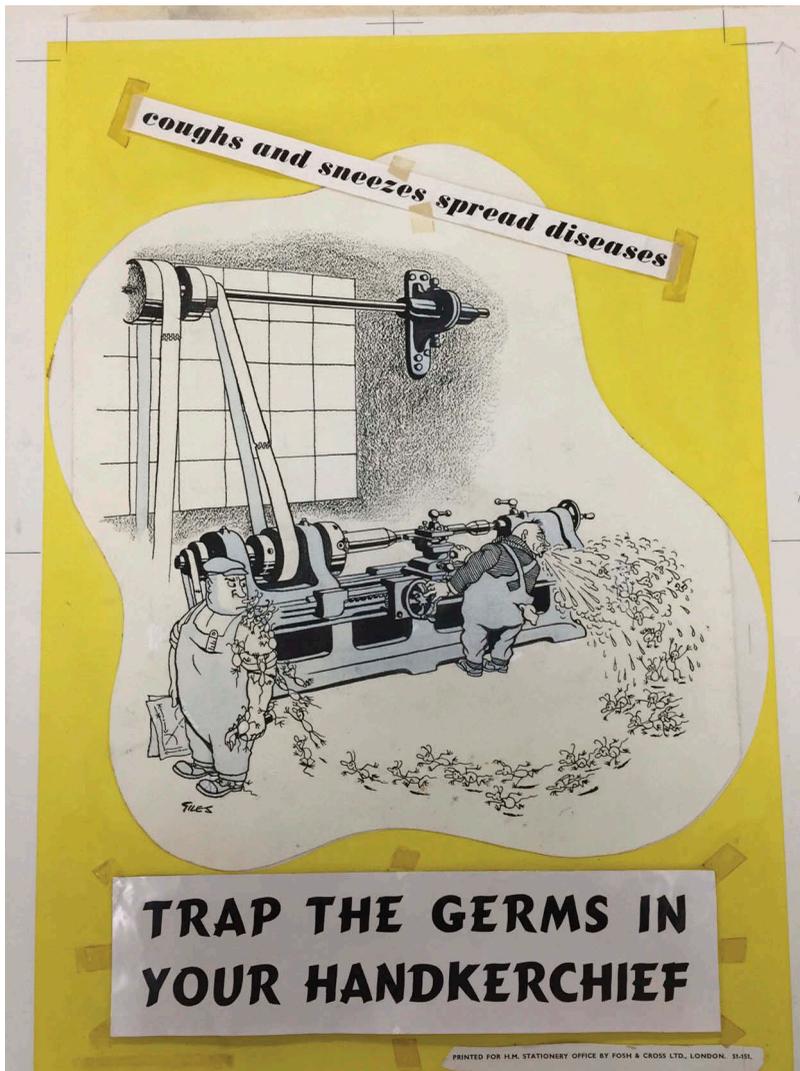


Figure 7. A draft of the public health poster using Giles' illustration, using the same slogan as earlier examples, but a quite different mode of visual communication, relying extensively on humour and depicting the germs as cartoonised characters. ('Ministry of Information: Original Art Work, 1939–1946', INF 3/407F, National Archives.).

disease.¹¹⁰ The Mount-Evans studio was therefore highly experienced in the medium, and they continued to engage closely with themes of health through a series of diphtheria immunisation posters and anti-smoking campaigns produced from 1950s onwards.¹¹¹

From the early 1950s, the Mount-Evans posters created a new visual language of germs based on increasing abstraction. No longer did the images focus on the anthropomorphic germ, but instead the agents of disease were implicated indirectly, represented in some cases by striking black arrows of particles (November 1960), whilst the 'Rogues Gallery' (reprinted August 1964) highlighted the importance of handwashing before food preparation and using the bathroom because 'hands spread germs'.¹¹²

Taken as a collective, these posters demonstrate three critical features of germ imagery in the service of public health. First, It is clear that the metaphor of conflict between germs on the one hand and the body's defence and medical science on the other was not itself a product of wartime. As John W. Ritchie noted in his popular 1909 book *Primer of Sanitation*, itself 'suitable for school use' and containing 'the more important facts in regard to germ disease and their prevention [*sic*]', '[b]etween these germs and the body there is never-ceasing war. The germs attack the body. They try to grow in it and use it for food. To defend itself the body kills the germs. Day by day and year by year the struggle goes on, the germs attacking, the body fighting to keep out the germs'.¹¹³ Second, whilst there was striking continuity of message across the posters, based around the twin message that 'coughs and sneezes spread diseases' and that individuals had responsibility to 'trap the germs', the visual strategies for communicating these to public audiences were highly variable. Third, they show the inherent diversity of germ representations, set against the backdrop of such robust and long-lasting hygiene messages. Germs were reimagining and repurposed in numerous ways, reflecting public perceptions of disgust, anxiety and apprehension about their incursion into homes and workplaces.

Conclusion

Amongst professional communities, we know that the events which constituted the so-called 'Bacteriological Revolution' in Britain resulted in neither a total nor rapid, but a protracted and incomplete, shift in perceptions of disease causation.¹¹⁴ Late nineteenth century germ imagery often imagined that there was somehow something distinct about different forms of infectious disease; adverts for disinfectants used visual cues to claim that their products could combat a writhing monster composed of twisting strands of 'disease germs, zymotic diseases, typhoid, small pox, cholera and scarlet fever' (see [Figure 8](#)).¹¹⁵ Advertisements for disinfectants, such as Sanitas in Britain and L'Anios in France, also represented the embodied microbe of various diseases with distinctive visual properties. In the case of L'Anios, a major poster campaign from around 1910 included the figures of 'charbon' (anthrax) as a red-eyed skull with the feet of a duck and 'phtisie galopante' (literally, galloping consumption or pulmonary tuberculosis) as a horse-headed animal with claws.¹¹⁶ The causal differentiation of germs, responsible for specific diseases, was a prominent feature of public bacteriological discourse in the decades around 1900. Subsequent outbreaks of disease – such as the typhoid epidemic which hit Croydon in 1937 – served to reinforce the connection between specific microorganisms and diseases.¹¹⁷

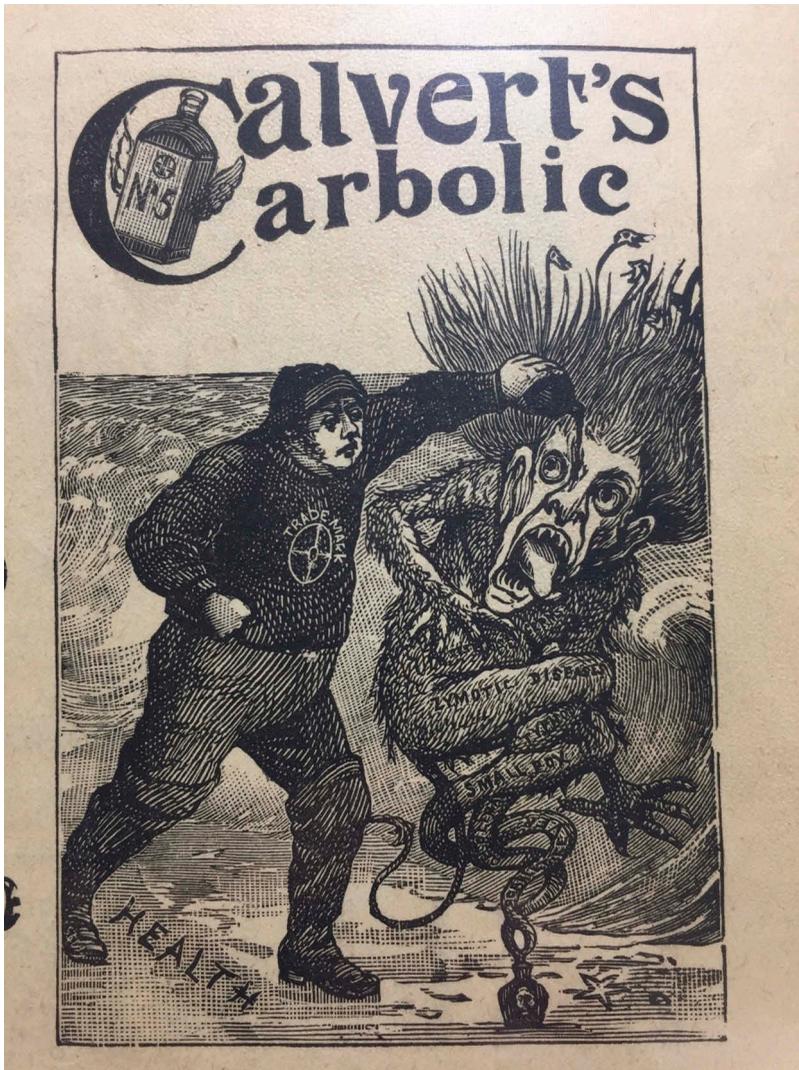


Figure 8. The figure of HEALTH quells a monster comprising twisting limbs of 'disease germs', 'zymotic diseases', 'smallpox', 'cholera' and 'scarlet fever' in an advertisement for Calvert's Carbolic Disinfectant. (F. C. Calvert & Co., 'The Only Reliable Disinfectants are "Calverts" Carbolic Acid and Preparations', c.1885, 'Disinfectants Ephemera. Box 1', EPH 175:7A, Wellcome Library.).

Meanwhile, as Anne Hardy has recently argued in her work on *Salmonella*, British attitudes towards cleanliness and, in particular, hand hygiene, were particularly ambivalent in the early twentieth century.¹¹⁸ Hardy's exploration of the increasing understanding of *Salmonella*'s infective pathways during the interwar period might appear to reinforce the existence of a public discourse of germ specificity. However, given the commercial and public health imperatives to warn of the dangers of 'germs' more generally, the posters and films featured here instead suggest that a visual language of broad, rather than narrow, appeal was the strategy of choice for those who claimed preventive properties for their products or aimed to communicate hygiene messages to the population at large.¹¹⁹

By the interwar period, the public controversy surrounding the veracity of germ theories of disease – so prevalent in the late nineteenth century – had almost entirely dissipated.¹²⁰ However, it is far from certain whether the ambiguous status and identity of germ theories of disease translated into popular discourse, and if so, how. By exploring the visual culture and graphic presentation of germs to British audiences, however, a new tension between pre- and post-germ conceptualisations of disease causation and agency emerges. On the one hand, the audience's perception of germs as disease-causing agents was taken for granted by the HCC who commissioned the *Giro* films; on the other, some of the key underlying messages of sanitary practices remained focused resolutely on hygienic measures which did not reference germs at all, and whose application was entirely commensurable with ongoing adherence to the causal mechanisms of miasmata and contagion.¹²¹

In the case of the United States around the turn of the twentieth century, Chloe Burke has argued that the visual language of germs, infection and epidemic were powerful analogues for political discourse. Even in a post-germ age from the 1890s, representations of infection as a miasmatic cloud or invading foreign body, laden with contagion, continued to hold sway in the popular imagination.¹²² Meanwhile, Tim Boon has highlighted the diverse approaches evident in common documentary practice in Britain during the 1930s, especially the persuasive function of films distributed by the Central Council for Health Information (which included films by the HCC).¹²³ The expansion of film as a popular medium in the interwar period provided a new way in which germs and their vectors could be represented as active entities in their own right, marauding into or hidden around the home, lying in wait to ensnare the unsuspecting or inattentive resident. These messages were appropriated for commercial purposes, and established a trend which characterised the home as a battleground around which householders waged constant war against the unseen germ enemy.

The actors behind early twentieth century filmic and mid-century graphic representations of germs also relied on established modes of communication in order to create messages which resonated with their audiences. In the case of the *Giro* films and *See How They Won*, this was realised through the liberal deployment of rhyme, classic animation methods and styles of the period, and a humorous tone to capture audience attention. Germs provided a vehicle for a wide range of social anxieties, including racial and hygienic degeneration, insanitary habits, national security and the precarity of the domestic space and workplace. Close connections between the presence of dirt and germs, typical in popular bacteriology-related writing, were made all the more immediate through the mediums of film and poster. The language of agency, with germs as highly active participants in a conflict with practitioners of good health, translated into images in which opportunistic germs colluded and planned, taking advantage of hygiene weakness and revelling in victory over bodily immunity and the sanitary integrity of the built environment. For children in particular, the performative elements of germ activity were also realised through a number of plays, such as those produced by the Health and Cleanliness Council, as well as Eunice Close's post-war *Germs versus Fairy Good Health* (1954). Here, the hygienic characters of Fresh Air, Exercise, Cleanliness and Sleep, as well as Vitamins A, B, C and D – all overseen by Fairy Good Health – arrive to thwart the planned infection by Measles, Mumps, Influenza

and Sore Throat.¹²⁴ These were quite clearly developed in the mode of the HCC, demonstrating the long-lasting effect of the organisation's campaigns.

Poster campaigns during and immediately after the Second World War drew on and developed, rather than initiated, the metaphor of militarised conflict between human bodies and germs. Such representations of germs – as hostile invaders – arguably owed more to the investigative strategy of Robert Koch and other so-called ‘microbe hunters’ active around the turn of the twentieth century. The approach of Koch and his German counterparts was critical in shaping British practices and perceptions of bacteriology, bringing with it a narrative of conflict between body and microorganism.¹²⁵ The weaponisation of microbes such as cholera and anthrax in late nineteenth-century literature – exemplified in H. G. Wells's *The Stolen Bacillus* and Thomas Mullett Ellis's *Zalma*, both published in 1895 – was perhaps also critical in shaping attitudes towards the potential of these organisms to invade and attack.¹²⁶ The later reimagining of the body as a national space, repelling invading forces of the axis powers, were reconfigurations of these established narratives of conflict in the relationship between humans and germs. Whilst it is instructive to reflect on these trends in the materials underpinning our research, it is therefore also worth noting that our findings offer the opportunity to look more generally at the socio-cultural role of microbes in everyday life – through feature film, advertising materials, domestic products – as well as the importance of visual communication and science education. Historians might also pursue the effects which these images had on their intended audience (and others); the potential social significance of germ representations in shaping naïve biological understanding is a worthy one. A deeper understanding of these images in their own right invites us to think more fully about their effect on publics' attitudes towards ideas far beyond science, encompassing the lived environment, nationalism, gender, race and class. We might also usefully look to other national contexts, where these wider social themes played critical roles in the construction of germ identities and germ–body relationships, all the while both reflecting and informing wider social norms.

Notes

1. Maria H. Nagy, ‘Children's Theories Concerning the Origin of Diseases’, in *Proceedings and Papers of the 12th International Congress of Psychology at Edinburgh* (Edinburgh, 1950), pp. 96–97.
2. Maria H. Nagy, ‘Children's ideas on the origin of illness’, *Health Education Journal*, 9 (1951), pp. 6–12, 6.
3. Maria H. Nagy, ‘The Representation of “Germs” by Children’, *The Journal of Genetic Psychology*, 83 (1953), pp. 227–40, 227.
4. Nagy, ‘Representation of “Germs”’, p. 228.
5. *ibid.*, p. 233.
6. *ibid.*, p. 233.
7. Ilana Löwy, ‘Immunology and Literature in the Early Twentieth Century: “Arrowsmith” and “The Doctor's Dilemma”’, *Medical History*, 32 (1988), pp. 314–32; Ilana Löwy, ‘Martin Arrowsmith's Clinical Trial: Scientific Precision and Heroic Medicine’, *Journal of the Royal Society of Medicine*, 103 (2010), pp. 461–66; William C. Summers, ‘On the Origins of the Science in *Arrowsmith*: Paul de Kruif, Felix d'Herelle, and Phage’, *Journal of the History of Medicine and Allied Sciences*, 46 (1991), pp. 315–32.

8. Most recently, Dimitriy Myelnikov has charted the surprisingly long-lived endeavours linked to phage therapy in the USSR, despite its relatively rapid decline in the West following an energetic and optimistic series of investigations in the interwar period: Dimitriy Myelnikov, 'An Alternative Cure: The Adoption and Survival of Bacteriophage Therapy in the USSR, 1922–1955', *Journal of the History of Medicine and Allied Science*, 73 (2018), pp. 385–411. For more on the significant developments in early twentieth-century microbiology, see: Warwick Anderson, 'Natural Histories of Infectious Disease: Ecological Vision in Twentieth-Century Biomedical Science', *Osiris*, 19 (2004), pp. 39–61; Robert Bud, *Penicillin: Triumph and Tragedy*. Oxford: Oxford University Press, 2007; Scott Podolsky, *The Antibiotic Era: Reform, Resistance, and the Pursuit of a Rational Therapeutics* (Baltimore, 2014).
9. Jennifer Tucker, *Nature Exposed: Photography as Eyewitness in Victorian Science* (Baltimore, 2005); Lorraine Daston and Peter Galison, *Objectivity* (2007); Nick Hopwood, *Haeckel's Embryos: Images, Evolution, and Fraud* (Chicago, 2015).
10. Nancy Tomes, *The Gospel of Germs: Men, Women, and the Microbe in American Public Life* (Harvard, 1999). A quasi-analogous study of the British case by Michael Worboys discusses the incomplete adoption of germ theories of disease within the professional context of bacteriology in Britain, but does not engage with the importance of representations to and within wider audiences. See: Michael Worboys, *Spreading Germs: Disease Theories and Medical Practice in Britain, 1865–1900* (Cambridge, 2000). More recently, Rosemary Wall's study of bacteriology in Britain around the turn of the twentieth century discusses images in a professional context in passing, focusing on their production and exchange between researchers, whilst Virginia Smith's work on hygiene and cleanliness does not engage with the visual culture of microbes. See: Rosemary Wall, *Bacteria in Britain, 1880–1939* (London, 2013), p. 104; Virginia Smith, *Clean: A History of Personal Hygiene and Purity* (Oxford, 2007), pp. 297–302.
11. Tomes, *Gospel of Germs*, p. 13.
12. *Ibid.*, p. 120.
13. Nancy Tomes, *Remaking the American Patient: How Madison Avenue and Modern Medicine Turned Patients into Consumers* (Chapel Hill, 2016). Notwithstanding the work of JoAnne Brown which highlights the context of germ imagery in relation to germ theories of disease for the United States context. See: JoAnne Brown, 'Crime, Commerce, and Contagionism: The Political Languages of Public Health and the Popularization of Germ Theory in the United States, 1870–1950', in Ronald G. Walters (ed.), *Scientific Authority and Twentieth-century America* (Baltimore, 1997), pp. 53–81.
14. Whilst the representation of germs as a specific focus does not explicitly feature, public health imagery in other national contexts has not gone unremarked. For examples from the broader European context, see: Philipp Sarasin, 'Anthrax': *Bioterror als Phantasma* (Frankfurt am Main, 2004); Philipp Sarasin, Silvia Berger, Marianne Hänseler and Myriam Spörri, *Bakteriologie und Moderne – Studien zur Biopolitik Des Unsichtbaren 1870–1920* (Frankfurt am Main, 2007).
15. Roger Cooter and Claudia Stein, 'Visual Imagery and Epidemics in the Twentieth Century', in David Serlin (ed.), *Imagining Illness: Public Health and Visual Culture* (Minneapolis, 2010), pp. 169–92.
16. Martina King, 'Anarchist and Aphrodite: On the Literary History of Germs', in Thomas Rütten and Martina King (eds), *Contagionism and Contagious Diseases: Medicine and Literature 1880–1933* (Berlin, 2013), pp. 101–130, 103.
17. Koch was repeatedly described as a 'microbe hunter' in the British press, and British bacteriologists consciously emulated the methods and approaches of German bacteriology over and above those favoured in France. In 1890, for example, the *Birmingham Daily Post* described Koch as having 'long since established a reputation as a successful microbe-hunter'. '[Leading Article]' *Birmingham Daily Post*, 31 October 1890, p. 4. For more discussion on Koch's work and his influence on the British bacteriological community,

- see: Christoph Gradmann, *Laboratory Disease: Robert Koch's Medical Bacteriology* (Baltimore, 2005), pp. 115–16; and Worboys, *Spreading Germs*.
18. For more on the theme of environmental health and vector-borne diseases, see: Edmund Russell, *War and Health: Fighting Humans and Insects with Chemicals from World War I to Silent Spring* (New York, 2001); Michelle Mart, *Pesticides, a Love Story: America's Enduring Embrace of Dangerous Chemicals* (Lawrence, 2015). The noted British graphic designer Abram Games, whose work for the British government included posters featuring the 'Games hand', warning of the dangers of venereal disease, also created a series of striking images associated with malaria. See, for example, Abram Games, 'The Malaria Mosquito Forming the Eye-Sockets of a Skull, Representing Death from Malaria. Colour Lithograph', Wellcome Library no. 20276i (HMCO, London, c.1941), .
 19. *Giro the Germ Episode 1*, Health and Cleanliness Council, 1927, British Film Institute, 7:25, <https://player.bfi.org.uk/free/film/watch-giro-the-germ-episode-1-1927-online>, accessed 14 February 2018.
 20. Smith, *Clean*, p. 310.
 21. W. Allen Daley, *Annual Report upon the Health of Hull for the Year 1926* (Hull, 1927), p. 119.
 22. Evert G. Routzahn, 'Education and Publicity', *American Journal of Public Health*, 21 (1931), pp. 1297–1300, 1300; and 'The Health and Cleanliness Council', *Public Health*, 48 (1934), pp. 88–9, 89.
 23. *The New Home: A Handbook for Tenants*, Warwick Digital Collections, 177/5/8/2 (Health and Cleanliness Council, London, 1937), p. 3; and *Hints for the Busy Housewife*, Warwick Digital Collections, 177/5/8/1 (Health and Cleanliness Council, London, 1939), p. 3.
 24. 'The Health and Cleanliness Council', *Public Health* 41 (1928), p. 205; 'Central Council for Health Education: Minutes and Papers', MH 82, National Archives, Kew, London; 'The Health and Cleanliness Council' *Health Education Journal* 4:3 (1946), p. 108. For more on the Central Council for Health Education, see: Allen Daley, 'The Central Council for Health Education: The First Twenty-Five Years: 1927–52' *Health Education Journal* 17:1 (1959), pp. 24–35.
 25. Timothy M. Boon, 'Films and the Contestation of Public Health in Interwar Britain'. Unpublished PhD thesis: University of London, 1999, p. 165.
 26. Timothy M. Boon, 'Health Education Films in Britain, 1919–39: Production, Genres and Audiences', in Graeme Harper and Andrew Moor (eds), *Signs of Life: Medicine and Cinema* (London, 2005), pp. 45–57, 47. For example, women of the house were urged to keep their homes well-lit in order to highlight any areas of dirt, a suggestion which not a generation earlier had met with a scathing reception from those responsible for keeping their household clean. *Hints for the Busy Housewife*, p. 6. For more on electrical technologies in the domestic space in the early twentieth century, see: Graeme Gooday, *Domesticating Electricity: Technology, Uncertainty, and Gender, 1880–1914* (London, 2008), ch. 5.
 27. 'The Health and Cleanliness Council', *Public Health*, 48 (1934), pp. 88–9, 89.
 28. 'A Health Propaganda', *The Lancet* (6 July 1929), p. 54.
 29. J. Greenwood Wilson, *City and Port of Cardiff. Public Health Department. Annual Report, 1938* (Sergeant Brothers, Abergavenny, 1939), pp. 124–125.
 30. E. J. S. Lay (ed), *Macmillan's Teaching Practice*, 6 vols (London, 1938), pp. 8–10.
 31. 'The Danger of Dirt. Colour Lithograph after A. Games, 1935', (London 1935, Wellcome Library, London, no. 20271i. For more on Games – who played a critical role in government poster design during the Second World War – see: Catherine Moriarty, June Rose and Naomi Games, *Abram Games: His Life and Work* (Princeton, 2004); Naomi Games and Brian Webb, *Abram Games. Design* (Suffolk, 2013). For more on Braddell, see: in Elizabeth Darling, "'The House that is a Woman's Book comes True": The All-Europe House and Four Women's Spatial Practices in Inter-war England', in Elizabeth Darling and Lesley Whitworth (eds), *Women and the Making of Built Space in England, 1870–1950* (London, 2007), pp. 123–42, pp. 133–40; Jonathan Woodham, 'Dorothy Adelaide Braddell (1889–1981)' in *Oxford Dictionary of National Biography*, vol. 7, (Oxford, 2004), pp. 170–71; 'Dorothy Braddell, graphic and interior designer: papers', AAD/1980/2, V&A

- Collections. Other images produced by Braddell for the HCC included ‘The House that Jill Cleaned’, also from the late 1920s, highlighting the importance of both domestic and personal cleanliness. See: ‘The House that Jill cleaned’, E.722–1978, V&A Collections.
32. ‘The Safe Way to Health’, *The Lancet* (19 September 1936), p. 722.
 33. The HCC also produced other films, including *A Dangerous Handicap* (1927) which also showed how to deal ‘with the problem of domestic cleanliness’ (‘English Motion Pictures’ *American Journal of Public Health*, 17 (1927), p. 1300).
 34. Central Information Bureau for Educational Films, Ltd., *A National Encyclopaedia of Educational Films and 16mm. Apparatus Available in Great Britain 1937–8* (London, 1938).
 35. *Giro the Germ*, 2:04.
 36. *Ibid.*, 3:10.
 37. *Ibid.*, 3:55.
 38. *Ibid.*, 6:33.
 39. *Ibid.*, 7:17.
 40. Fleischer had pioneered this in the 1910s, and his invention culminated in a US patent: Max Fleischer, ‘Method of producing moving-picture cartoons’, US Patent 1242674, 9 October 1917. Fleischer had developed a series of short animations using the rotoscope during the First World War, but it came to wider public attention through his series of silent films – *Out of the Inkwell* – featuring Koko the Clown. Ray Pointer, *The Art and Invention of Max Fleischer: American Animation Pioneer* (Jefferson, 2017); Donald Crafton, *Before Mickey: The Animated Film, 1898–1928* (Chicago, 1993).
 41. Alison Abra, ‘Going to the Palais: A Social and Cultural History of Dancing and Dance Halls in Britain, 1918–1960’, *Contemporary British History*, 30 (2016), pp. 432–33.
 42. *Giro – Fast and Loose*, Health and Cleanliness Council, 1935, British Film Institute, 0:40, <https://player.bfi.org.uk/free/film/watch-giro-fast-and-loose-1935-online>, accessed 14 February 2018.
 43. *Giro – Fast and Loose*, 5:31.
 44. *ibid.*, 1:14, 6:41.
 45. ‘[Untitled]’, *Monthly Film Bulletin*, 2 (1935), p. 158.
 46. ‘Health Week’, *Exeter and Plymouth Gazette*, 15 October 1928, p. 5.
 47. ‘Health Week’, *Leeds Mercury*, 8 October 1928, p. 7; and ‘Westbury WI’, *Buckingham Advertiser and Free Press*, 22 October 1938, p. 5.
 48. ‘Hospital of St. Cross. Fourth Health Lecture’, *Rugby Advertiser*, 8 November 1929, p. 9.
 49. James Grant and R. W. Wilkinson, *Annual Report of the Public Health Department for Year 1937* (Howe Brothers, Gateshead, 1938), p. 55.
 50. ‘London Letter’, *Shields Daily News*, 29 January 1931, p. 2.
 51. This was not universally the case, of course. Rev. L. Sargent showing of ‘two films of “Giro the Germ” lent [*sic*] by the Health and Cleanliness Council’ for the Westbury Women’s Institute in Buckinghamshire in October 1938, which were ‘amusing and instructive and were much enjoyed.’ ‘Westbury W.I.’, *Buckingham Advertiser and North Bucks Free Press*, 22 October 1938, p. 5.
 52. ‘Health Campaign in Derbyshire’, *Derby Daily Telegraph*, 18 June 1930, p. 3.
 53. *ibid.*
 54. ‘[Leading Article]’, *Hull Daily Mail*, 5 October 1928, p. 3.
 55. ‘Mass Attack on Disease’, *Derby Daily Telegraph*, 3 October 1930, p. 8.
 56. Grant and Wilkinson, *Annual Report of the Public Health Department for Year 1937*, p. 52; and J. K. W. Morris, *Report on the Health of the District During the year ending December 31st, 1938* (Times, Mexborough, 1939), p. 4.
 57. ‘Health Week’, *Exeter and Plymouth Gazette*, 17 October 1927, p. 5.
 58. ‘Health Week Efforts in Warwickshire. Statement by County Medical Officer’, *Warwick and Warwickshire Advertiser*, 4 October 1930, p. 8.
 59. ‘Interesting Lecture at Rugby’, *Rugby Advertiser*, 19 November 1929, p. 2.
 60. ‘Educational Films: Notable Pictures at Belfast Museum’, *Northern Whig*, 20 November 1933, p. 11.

61. 'Modern Wonders at Bath Scientific Exhibition', *Bath Chronicle and Herald*, 11 April 1931, p. 14.
62. 'Health Lecture and Films', *Lichfield Mercury*, 7 June 1935, p. 9.
63. 'County Business. To-day's Council Meeting', *Coventry Evening Telegraph*, 12 November 1929, p. 6. Parkes was not alone in finding the features of Giro 'too friendly'. Reporting on a showing from June 1929, an article in the *Coventry Herald* described the germs as 'much-too-attractive-looking', even though '[h]earty applause punctuated the performance as the points went home.' 'Health Association Films', *Coventry Herald*, 22 June 1929, p. 9.
64. 'Publications', *The Woman Teacher* 15 (1934), p. 558.
65. Zillah Walthew, *The Defeat of the Germs* (London, 1936). Walthew produced a number of other texts related to school education. See, for example: Hilda Haig-Brown and Zillah Walthew, *At the Shops* (Oxford, 1943); Hilda Haig-Brown and Zillah Walthew, *Speech-training rhymes and jingles for use in infant and junior schools* (London, 1936); and Hilda Haig-Brown and Zillah Walthew, *Toys* (Oxford, 1942).
66. *The Defeat of the Germs*, p. 9.
67. *ibid.*, p. 11.
68. *ibid.*
69. Health and Cleanliness Council, *Ten Dirty Little Boys*, 1929, <https://player.bfi.org.uk/free/film/watch-ten-little-dirty-boys-1929-online>, accessed 12 March 2018.
70. See, for examples in this large field of literature: Bernard Harris and Waltraud Ernst (eds), *Race, Science and Medicine, 1700–1960* (London, 1999); Margaret Humphreys, *Malaria: Poverty, Race, and Public Health in the United States* (Baltimore, 2001); Paul Weindling, *Health, Race and German Politics between National Unification and Nazism, 1870–1945* (Cambridge, 1993). An analysis of the racial dimensions of germ figures, particularly one rooted in international comparison, would be a productive avenue for other scholars to follow.
71. Rachel Low, *The History of the British Film, 1929–1939: Films of Comment and Persuasion of the 1930s* (London, 1979), pp. 138–39.
72. See *How They Won*, 1935, 0:50, Boots Company Archive, Nottingham, UK (hereafter: BCA), CD1 400/1.
73. See *How They Won*, 1935, 2:08; 4:10.
74. *ibid.*, 5:10; 5:40.
75. 'Animated Cartoons for Health Propaganda', *The Lancet*, 28 September 1935, pp. 749–52, 752.
76. 'Colour in Film Advertising', *Manchester Guardian*, 25 September 1935, p. 16.
77. 'Royal Theatre, Alfreton', *Ripley and Heanor News*, 29 November 1935, p. 3; 'Welfare Work Helps to Create Boots Prosperity', *Nottingham Journal*, 1 January 1936, p. 54; 'Our Winter Health Campaign Booklet', 1935, BCA, WBA/BT/11/39/3/10.
78. 'The Game of Good Health', 1935, BCA, WBA/BT/11/39/3/9.
79. 'The Game of Good Health', 1935.
80. Genatosan Ltd., *Destroy the Microbes* (Loughborough, c.1935), p. 1.
81. Stanhope Bayne-Jones, *Man and Microbes* (Baltimore, 1932), pp. 100, 102.
82. 'Find the Hidden Germs', c.1935, Drug Advertising Ephemera, Box 18, EPH292, Wellcome Library, UK. Such images, which encouraged readers to 'find the hidden germs', with their twisted faces just visible in tree trunks, were supplemented by other advertisements with 'hidden fairies of health'. 'Find the Hidden Fairies of Health!', c.1935, Drug Advertising Ephemera, Box 18, EPH292, Wellcome Library. The supposed conflict between wizened germs and benevolent fairies mirrored popular narratives from nineteenth century children's literature. See: Melanie Keene, *Science in Wonderland: The Scientific Fairy Tales of Victorian Britain* (Oxford, 2015).
83. Rachel Low, *Films of Comment and Persuasion of the 1930s* (London, 1979), p. 152. Low does not acknowledge the seemingly interchangeable nature of Giro between individual identity as the key protagonist in the films, and his anonymous nature as simply one of the many germs represented in this way.

84. 'The Health and Cleanliness Council. Address by Colonel Fremantle, M.D., M.P.', *The Lancet*, 30 March 1929, pp. 695–696, p. 695.
85. Kyra Whitton, 'Women as Subject and Audience in World War II Venereal Disease Posters', unpublished MA Dissertation, Kennesaw State University, 2010. For more on the issue of venereal disease in the period immediately prior, see: Anne R. Hanley, *Medicine, Knowledge and Venereal Diseases in England, 1886–1916* (Basingstoke, 2017).
86. Samuel Barron, *Report on the Health of the County Borough of Belfast for the Year 1945* (Belfast, 1946), p. 5. The much-studied campaign of posters addressing venereal disease sit outside our field of interest here, yet it is worth noting that Abram Games, who we encountered earlier in his capacity as co-designer with .
87. C. Leonard Williams, *Borough of Barking: The Annual Report of the Medical Officer of Health* (London, 1946), p. 25.
88. For biographical details of Bateman, see: Anthony Anderson, *The Man who was H. M. Bateman* (Exeter, 1982). A compendium of some of Bateman's earlier works was published in 1921 with an introduction by G. K. Chesterton. See: H. M. Bateman, *A Book of Drawings* (London, 1921). This complemented earlier publications which focused on his specific style of caricature, burlesque. See: H. M. Bateman, *Burlesques* (London, 1916).
89. 'Health education – Central Council for Health Education', 1941–51, LCC/CL/PH/1/154, London Metropolitan Archives; 'The Central Council for Health Education: invitation to nominate representative to serve on the Central Council', 1935–58, MH 96/874, National Archives, Kew.
90. 'Coughs and Sneezes Spread Diseases', 576162i, Wellcome Library; 'A woman coughing or sneezing without a handkerchief in a draper's shop. Lithograph after H.M. Bateman', 38541i, Wellcome Library (HMSO, London, c.1942); 'A woman coughing in a railway carriage. Lithograph after H.M. Bateman', 22641i, Wellcome Library (HMSO, London, c.1942) .
91. 'Posters: Coughs and Sneezes, 1941–1961', 1941–2, BN 10/218, National Archives.
92. Rebecca Lewis, 'The Planning, Design and Reception of British Home Front Propaganda Posters of the Second World War'. Unpublished PhD thesis: University of Winchester, 2004; '[Untitled]' *Advertiser's Weekly* 126:1644 (1944), p. 294.
93. For some of the earlier activities of the NSFA, see original records at: 'National Safety First Association', 1929–1938, SC/P/29/3, Southampton Archives Office. 'The "Safety First" Movement. Scottish Council to be set up. Education against Accidents' *Glasgow Herald*, 11 October 1930, p. 7.
94. Philip Mendoza, 'Hints for Beginners – by Mendoza' *Advertiser's Weekly*, 123: 1599 (1944), p. 54.
95. For some examples of cartoons based on the character of Percy Vere, see: 'Percy Vere – Number 17', c.1943, Art.IWM PST 14510, Imperial War Museum; 'Percy Vere – Number Eight (Recto) Are All your Guards Present and Correct? (Verso)', c.1943, Art.IWM PST 14502, Imperial War Museum. For more on Mendoza, see: Alan Clark, *Dictionary of British Comic Artists, Writers and Editors*. London: British Library, 1998, p. 110.
96. 'A finger-wound being attacked by germs represented by German soldiers in World War II. Colour lithograph after P. Mendoza', 1940, 680216i, Wellcome Library.
97. 'German soldiers in World War II representing germs invading a wound, British soldiers representing white corpuscles resisting and capturing them. Colour lithograph after P. Mendoza', c.1941, 680213i, Wellcome Library.
98. 'German soldiers in World War II', c.1941.
99. As well as posters for the RoSPA, Rothholz also went on to create designs for the Post Office, the 1948 Olympic Games, Festival of Britain and numerous commercial clients. See, for examples of his later work: 'Poster advertising final posting dates for the festive period; featuring a Christmas tree and a candle', 1951, POST 110/1276, Postal Museum.
100. 'A hand injured by a wooden stick which is also a pole bearing Germanic lettering and a swastika, comparing Germany in wartime to germs. Colour lithograph after H.A. Rothholz', c.1943, 32607i, Wellcome Library. A copy is also held at the H. A. Rothholz Archive, see:

- 'Germs Invade / get first aid and don't help the enemy', c.1943, GB 1837 DES/RHZ/4/2/2, H. A. Rothholz Archive, University of Brighton Design Archives (hereafter UBDA).
101. 'Be in the fashion – cover your hair', 1940, GB 1837 DES/RHZ/4/2/18, UBDA; RoSPA to H. A. Rothholz, 6 July 1942, GB 1837 DES/RHZ/1/1/38, UBDA.
 102. For more on Massingham's life, see: Bob Baker, 'Richard Massingham' *Film Dope* 41 (1989), pp. 1–3; Geoff Brown, 'Richard Massingham: the Great English Cineaste?' *Cinegraphie* 15 (2000), pp.351–361. A brief but excellent overview of his significance for film is available through the British Film Institute. See: Geoff Brown and Bryony Dixon, 'BFI Screenonline: Massingham, Richard (1898–1953) Biography', 2003–14, available online at: <http://www.screenonline.org.uk/people/id/521707/index.html>, accessed 15 March 2018.
 103. *Jet-propelled Germs* dir. Richard Massingham, 1948, available online at: <https://player.bfi.org.uk/free/film/watch-jet-propelled-germs-1948-online>, accessed 15 March 2018.
 104. 'Jet-Propelled Germs: Commentary as Actually Spoken', 9 December 1948,.
 105. Ministry of Health to Public Relationship Films Ltd., 8 July 1948, 'Jet Propelled Germs (health) 1948', INF 6/935, National Archives.
 106. Peter Tory, *Giles at War*. London: Headline, 1994, pp. 145–155.
 107. James F. Stark, *The Making of Modern Anthrax, 1870–1920: Uniting Local, National and Global Histories of Disease*. London: Pickering and Chatto, 2013; London: Routledge, 2015, chapter 4.
 108. 'Ministry of Information: Original Art Work, 1939–1946', INF 3/407F, National Archives.
 109. 'Coughs and Sneezes Spread Diseases' (Ministry of Health, London, January 1948); and 'Posters: Coughs and Sneezes, 1941–1961', BN 10/218, National Archives.
 110. David Welch, *World War II Propaganda: Analyzing the Art of Persuasion during Wartime* (Santa Barbara, 2017); Joseph Darracott and Belinda Loftus, *Second World War Posters* (London, 1972).
 111. 'An ashtray of cigarette ends on a newspaper article warning against the danger of smoking', 22664i, Wellcome Library (HMSO, London, c.1962); 'A mother with a baby, referring to the need for immunisation against infectious diseases', 22661i, Wellcome Library (HMSO, London, c.1968).
 112. 'Coughs and Sneezes: "Trap the Germs in Your Handkerchief', (HMSO, London, 1960); 'Food Hygiene. Rogue's Gallery', BN 10/218, National Archives (HMSO, London, 1964).
 113. John W. Ritchie, illustrated by Karl Hassmann, *Primer of Sanitation: Being a Simple Work on Disease Germs and How to Fight Them* (London, 1909), pp. iii, 11.
 114. Michael Worboys, 'Was there a Bacteriological Revolution in Late-Nineteenth Century Medicine?' *Studies in History and Philosophy of Biological and Biomedical Sciences*, 38 (2007), pp. 20–42.
 115. F. C. Calvert & Co., 'The Only Reliable Disinfectants are "Calverts" Carbolic Acid and Preparations', c.1885, 'Disinfectants Ephemera. Box 1', EPH 175:7A, Wellcome Library.
 116. G. de Trye-Maison, 'Le microbe voilà l'ennemi. Pour le vaincre employez tous L'Anios desinfectant sans odeur', c. 1910, Wellcome Library no. 460155i.
 117. 'Croydon Typhoid Inquiry', *British Medical Journal*, 25 December 1937, p. 1293; 'The Croydon Epidemic of Typhoid Fever', *American Journal of Public Health* 28 (1938), pp. 644–66.
 118. Anne Hardy, *Salmonella Infections, Networks of Knowledge, and Public Health in Britain, 1880–1975* (Oxford, 2015), p. 228.
 119. Hardy, *Salmonella Infections*, p. 180.
 120. See Worboys, *Spreading Germs*, 2000. The artefacts of such debate lay in the continued and closely related anti-vivisection and anti-vaccination campaigns, neither of which provided serious objection to germs and their causal infectious potency; instead, they focused on the morality and danger of animal experimentation and inoculation respectively. For more on the anti-vivisection movement, see: A. W. H. Bates, *Anti-Vivisection and the Profession of Medicine in Britain: A Social History* (London, 2017), chs 4 and 5; Andrew Gardiner, 'The "Dangerous" Women of Animal Welfare: How British Veterinary Medicine Went to the

- Dogs', *Social History of Medicine*, 27 (2014), pp. 466–87; and Richard D. French, *Antivivisection and medical science in Victorian society* (Princeton, 1975).
121. Unsurprisingly, advertising material for products mirrored this, with prominent campaigns promoting disinfectants such as Kerol noting that 'every source whence infection may spring, every source whence disease arises, every source whence contagion may spread, every source where deadly germs, microbes, and bacteria have their origin, should be diligently disinfected.' Kerol, c.1910), 'Disinfectants Ephemera. Box 1', EPH 175:20, Wellcome Library.
 122. Chloe Serene Burke, 'Germs, Genes, and Dissent: Representing Radicalism as Disease in American Political Cartooning, 1877–1919', unpublished PhD dissertation, University of Michigan, 2004.
 123. Timothy Boon, 'The Smoke Menace': Cinema, Sponsorship and the Social Relations of Science in 1937', in Michael Shortland (ed.), *Science and Nature: Essays in the History of the Environmental Sciences* (Stanford in the Vale, 1993), pp. 57–88.
 124. Eunice Close, *Germs versus Fairy Good-Health: Short Play with a Moral for Children* (London, 1954).
 125. K. Codell Carter, *The Rise of Causal Concepts of Disease: Case Histories* (London, 2003), ch 2. See also, for a larger contextual discussion: Gradmann, *Laboratory Disease*; Worboys, *Spreading Germs*; Wall, *Bacteria in Britain*.
 126. James F. Stark, 'Medical Classics: *Zalma*', *BMJ*, 1 September 2010, <https://doi.org/10.1136/bmj.c4570>; Thomas Mullett Ellis, *Zalma* (London, 1895). *The Stolen Bacillus* was published as part of a collection of short stories under the same name: H. G. Wells, *The Stolen Bacillus, and Other Incidents* (London, 1895).

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