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Air in the bedroom

Between 1880 and 1881, Dr Benjamin Ward Richardson wrote a series of eight articles under the title 'Health at Home'. Published in the popular periodical *Good Words*, they offered advice on how to ensure that the design, construction, decoration and furnishing of the home were in line with the latest scientific and medical knowledge.¹ The articles were clearly expected to find a keen audience: as well as being published in *Good Words*, they also appeared in three American periodicals in the same years, in the British *Sanitary Record* the following year, and, slightly revised, were collected together as a book six years later under the title *Household Health*.² Richardson's pronouncements were also picked up by others: they were reviewed and summarized when they first appeared, and the Scottish author and journalist Alexander Hay Japp quoted approvingly and at length from these articles in his own book, *Industrial Curiosities* (1885). Richardson's advice was clearly deemed significant enough, and timely enough, to bear frequent reiteration.

Dealing in turn with each room of the house, Richardson began his discussion with the bedroom, although he recognized that this would elicit some objections. 'Why, in speaking of a home and fireside topics, should you begin with bedrooms?', he anticipated some readers asking:

There is the drawing room, surely, first to be thought of; that room in which the company gathers ... There is also the dining-room, or sitting-room, or breakfast-room, or study. Again, there is the kitchen – of all rooms, surely, the most important in every sanitary point of view? (Richardson 1880: 1.67)

These other rooms, as places of concourse or food preparation, were more obviously implicated in matters of health. Nonetheless, the bedroom was the place to begin 'because, after all, it is really the most important room in the house, by far and far again' (*ibid.*), for here we spend a third of our lives. Moreover, concluding his case with a rhetorical flourish, he asks, 'In what

other room in the house is so much of the life passed without change?’ (ibid.: 1.68). Bedrooms are occupied ‘without change’, their occupants unconscious, with none of the bustle characteristic of the household’s waking hours, and this causes him concern. His mission was a corrective one: to direct readers’ attention towards the still, quiet centre of the household. Health at home began with a healthy bedroom.

For Richardson, the bedroom was singularly in need of professional intervention not only because of the amount of time spent there or the vulnerability of unwitting sleepers, but also because it was a room unduly – and perilously – neglected by householders. It might be located at the front or back of the house; it may or may not have a fireplace; the windows might be of any size, and may or may not open; it may double as a lumber room, with all kinds of things stored under the bed; it is not infrequently damp. His aim is to offer some rules for the rectification of such egregious errors.

He first addresses the bedroom’s situation with regard to the rest of the house, offering advice on its ventilation, temperature, flooring and furniture. Then, turning to beds and bedding, he asserts the basic premise of a healthy nocturnal environment: ‘I cannot do better than commence what I have to say concerning beds and bedding by protesting against the double bed. The system of having beds in which two persons can sleep is always, to some extent, unhealthy’ (ibid.: 3.285). Sharing a bed, whether with a spouse, another family member, a visiting friend or fellow servant, had long been the European norm, and ‘even in middle-class households, bedfellows were thought a blessing’ (Ekirch 2005: 280) for reasons of security, warmth and intimacy.³ So what moved Richardson to insist so strongly on the undesirability of the double bed? On the basis of what evidence had he concluded that this longstanding practice was unhealthy? And to what extent was his view endorsed by his contemporaries as they reflected on the best ways of settling their bodies for sleep?

Richardson’s views were not those of a medical maverick. On the contrary, he was at the heart of the British medical establishment, which was increasingly seen as the guarantor of scientifically informed medical orthodoxy. His standing led to him being made a Fellow of the Royal College of Physicians, President of the Medical Society of London and a Fellow of the Royal Society, and his contribution to medicine was marked by a knighthood in 1893. He was at first best known as an innovator in the emerging field of anaesthetics, where his research was subsidized from 1863 to 1871 by the British Association for the Advancement of Science. But Richardson was also a committed and prominent campaigner in another key area of Victorian innovation: sanitary reform. He was a friend and follower of the greatest nineteenth-century public health reformer, Edwin Chadwick, and editor of Chadwick’s principal works; he was founder and editor of the *Journal of Public*

Health and Sanitary Review in 1855; and he was a tireless lecturer, author and campaigner for improved sanitation.

Richardson has not entered the hall of fame of nineteenth-century British sanitary reform alongside the likes of Chadwick, John Snow, Joseph Bazalgette, Florence Nightingale or Joseph Lister – the scientists, doctors, engineers and nurses credited with making the discoveries, instituting the reforms and developing the organizations and practices that instituted recognizably modern systems of disease control, public health infrastructure and medical hygiene in Britain. He was, however, as one historian has memorably termed him, ‘the patron saint of domestic sanitarians’ (Tomes 1990: 528), at the heart of a movement at its most influential in the final thirty years of the century, advocating the application of new understandings of the preventive and therapeutic powers of hygiene in the design and equipping of the home. Richardson was part of a general realignment of understandings of health with evaluations of cleanliness, to the point that the two came to be seen by many as coterminous. As the Harley Street physician Dr Alfred T. Schofield tersely put it, ‘Cleanliness all round is an essential law of health’ ([1890?]: 22). Long allied to godliness and ‘imbued with a moral and religious force’, cleanliness was expanding its operative sphere ‘from the domain of cosmetics to that of health, and ... the appeal to health became an ever more powerful motive for action’ (Temkin 1977: 468).⁴ ‘Hygiene’ – those practices where cleanliness and health meet – was pursued with increasing zeal in the nineteenth century, initially in public health measures and later in the domestic sanitation movement. In the final three decades of the century, domestic hygiene was accorded as much importance as public health in the campaign against communicable disease. Indeed, as the historian Alison Bashford argues, ‘“Public” health was secured largely in “private”; that is in domestic spaces’ (1998: 1).⁵ This is certainly how Richardson saw it: ‘The river of national health’, he wrote, ‘must rise from the homes of the people and from every home’ (1886: 7).

In discourses of public health and domestic sanitation, the hygiene or ‘regimen of health’ (Smith 2007: 3) at issue was to some extent personal (addressing the cleansing of bodies and clothing), but principally environmental and material. Driving the programmes for improvements in hygiene was a desire to control diseases which flourished in, and were spread by, filth. Prior to the acceptance of the germ theory of disease in the early twentieth century, ‘miasma’ theory, adhered to by such influential figures as Edwin Chadwick and Florence Nightingale, had long predominated as the explanation of the spread of infection.⁶ ‘All smell is disease’, wrote Chadwick (Bashford 1998: 6): for miasmatisers, disease was generated in and communicated by foul air, the infectious agents, or miasms, consisting ‘“almost entirely of decayed or diseased organized substances, and of animal emanations or secretions” ... usually supposed to enter the system through the lungs’ (Temkin 1977: 463,

464).⁷ Fuelling the public health innovations of the mid-nineteenth century such as Chadwick's sewer-building programme and Nightingale's hospital reforms, miasma theory underpinned the focus on the provision of pure air and the control of foul odours as a means of disease prevention. Water, as well as air, was also implicated in this theory of disease; indeed, as Nancy Tomes notes, 'all the evidence compiled by the clinical, pathological, and epidemiological investigations of the day seemed to verify the same focal points of infection: corrupted air and impure water' (1990: 517). Doctors variously named such diseases as zymotic (where the agent, often called a 'ferment', was the catalyst for disease in corrupted air or impure water) or pythogenic (where disease was generated by decomposing or decaying organic matter) as well as miasmatic, but the most striking umbrella term for them was the bluntly colloquial 'filth diseases'.⁸ In 'Filth Diseases and Their Prevention' ([1858] 1874), by the Chief Medical Officer John Simon, typhus fever is considered the Ur-filth disease, but other publications make clear just how broad the category was. The most terrifying were those that struck periodically as epidemics – cholera, typhus and scarlet fever – but the catalogue of filth diseases was still more wide-ranging. George Wilson, in his influential *Handbook of Hygiene and Sanitary Science*, wrote that 'the class of diseases which are associated with faulty house sanitation are essentially filth diseases, whether they originate *de novo* or are conveyed by befouled air or water' ([1873] 1883: 249). He enumerates these at length, including

diphtheria, ulcerated sore throat, follicular tonsillitis, follicular stomatitis, croup, enteric and ill-defined forms of fever, diarrhoea and dysentery, erysipelas, carbuncle, abscess, pyaemia, hospital gangrene, and puerperal fever. ... Pneumonia is frequently engendered by impure air, and it is now generally admitted that this filth-pneumonia, as it may be called, is infectious, and occasionally becomes epidemic. (ibid.)

Richardson's own list of filth diseases is similarly comprehensive. Under the heading of 'Communicable Diseases from Construction of Habitation' he discusses typhus fever, relapsing fever, scarlet fever, small pox, whooping cough, measles, sewer-air fever, typhoid or enteric fever, pulmonary consumption, as well as neuralgic and malarious diseases, colds, chills and irritations, and general malaise and physical feebleness (Richardson 1883: 5–22). Almost anything, from languor and headache through to consumption, pneumonia and typhoid, was attributable to the filth harboured in unhealthy houses. Eliminating filth, therefore, promised to be a panacea.

Contemporary understandings of disease transmission and of people's vulnerability to the dangers of the domestic environment were increasingly used to reshape the homes of the middle classes. Ironically, however, many of

the new domestic fitments intended to improve domestic hygiene came to be seen as actually having rendered these environments more dangerous.⁹ In the surgeon and sanitarian Thomas Pridgin Teale's popular handbook *Dangers to Health: A Pictorial Guide to Sanitary Defects* (1878), pictures of cross-sections of houses lay bare the multiple commonplace defects in domestic design and plumbing, showing how piped water, plumbed-in sinks and flush toilets, far from safeguarding the health, actually endanger it.¹⁰ Such fitments might empty into porous, leaky or untrapped sewers and drains, and thence into water courses that were also sources of drinking water; or they may allow toxic gas to seep silently from the sewer network back into the dwelling. The outcome was damp cellars, foetid air, polluted soil and contaminated water supplies. This, as Teale starkly put it, is 'How people drink sewage' (ibid.: XXX and XXXI). Such problems were endemic – indeed, George Wilson concluded that 'it is no exaggeration to say that in the vast majority of houses, and *especially good-class houses*, sanitary defects may be found which at any time may lead to the gravest consequences' ([1873] 1883: 249; my emphasis). If the houses are unhealthy – which most are – it is only a matter of time before their inhabitants also fall ill; in such conditions, when disease breaks out, 'the wonder often is that the inmates should have escaped so long' (ibid.). The more devices, appliances and systems for the removal of filth were installed, the more vulnerable the household was made. Concern about the domestic hygiene of the working classes had for some decades been the object of philanthropic middle-class concern, but now it became a matter of urgent and anxious self-reflection among the middle classes themselves.

It was just such a middle-class audience addressed by Richardson in *Good Words* and elsewhere. Advice on domestic sanitation featured widely in popular periodicals and handbooks in the 1870s and 1880s, and particularly following the Prince of Wales's typhoid fever of 1871, commonly thought to have been caused by sewer gas (Allen 2008: 50, 184–5). Publications directed at a concerned lay readership include those by Richardson, Wilson and Teale, but also indicative is a compendious volume entitled *Our Homes, and How to Make Them Healthy* (1883). Edited by the eminent physician, sanitarian and epidemiologist Sir Shirley Forster Murphy, the book comprises nearly a thousand pages of advice written by leading sanitarian architects, doctors and designers, the whole enterprise endorsed by a substantial introduction by Richardson, and covering everything from the optimal site for a house and the best means of ventilating it to the evils of flat-topped wardrobes and the healthiest colours for bedroom walls. Every aspect of the domestic environment was risky, every danger anticipated and addressed.

The domestic sanitarian platform was not limited to popular publications and lectures. In 1884, the International Health Exhibition, held in London and attracting some 4 million visitors, included a major exhibit entitled 'Sanitary

and Insanitary Dwellings'. In two purpose-built constructions, it demonstrated some of the common pitfalls in contemporary domestic design and how to avoid them (Adams 1996: 26–9).¹¹ The number of visitors attending the exhibition, together with the sheer quantity of publications on these matters, suggests the extent of public interest in the hidden structural and infrastructural defects threatening the home.

Some commentators thought the domestic sanitarians overstated their case, sceptical of their relentless cataloguing of domestic dangers. Commenting on Richardson's 'Health at Home' series, the *Saturday Review* suggests rather wryly that following an initial 'thrill of alarm' when learning of such dangers, the reader 'will be surprised that he is not a helpless invalid' as a result of all that he has overlooked (19 June 1880: 784). But despite the arch tone, even this reviewer does not dismiss the importance of 'Dr Richardson's dogma', but engages closely with it, suggesting that 'those who wish to sleep in healthy rooms should certainly consult his pages' (ibid.: 784, 785). Scepticism about the excessive zeal of the domestic sanitarian does not equate with dismissing his scientifically endorsed regimen altogether.

From a domestic sanitarian perspective, the middle-class home was far from being a simple haven of safety and calm in which to retreat, relax and recover. Instead, it was a place of actual and potential danger. Some of the threats were from toxins in domestic consumables, such as arsenic in wallpaper and paint, or fumes from burning coal or gas. But more unsettling was the pollution initiated by human beings themselves, as the emanations from their bodies and the effluvia of sanitation rendered the home toxic. Waste water from sinks and baths, air made foul by human excreta, exhaled breath laden with carbonic acid, skin shed from the body: human detritus lingered, haunting its progenitors as dust on top of cupboards, in contamination of the water supply, or as infiltration by sewage gas seeping back into the house. Silently and stealthily, these hazards threatened unprepared home-dwellers, compelling them to recognize the dangers posed by their own homes.

Such dangers were unsettling on several counts. First, their presence testified to the inadequacy of paying attention to sanitary detail in one's own property if the neighbours were not equally assiduous, as others' effluvia might taint one's own environment. Teale recounts the case of Mr Hewetson, who, despite correcting every fault in his house, could not eliminate the smell of drains. It transpired that foul gases from his neighbour's drains were drawn into the hall via a common chamber lying beneath the front steps. Gallingly, 'the neighbours had not suffered in health', while Mr Hewetson had suffered from 'drain illness'. Teale concludes rather wearily that 'it is difficult enough to manage one's own drains, almost Utopian to hope to rectify the drains of one's neighbour' (1878: XLV). Concern about the penetration of one's own property by the filth of others was a significant dimension of the objections

made to the establishment of a complex system of underground sewers. Michelle Allen has shown that the anxiety about sewer gas was not only to do with its dangers to health, but also with the way that sewers took the control of a household's effluence away from its inhabitants and invested it instead in an invisible system overseen by a metropolitan authority (Allen 2008: 25). London's new city-wide sewer system took the place of reliance on local and private cesspools, and made possible the admittance of an external threat: the sewage of one's neighbours might, as for Mr Hewetson, taint the air of one's own house. Allen cites a pamphlet by G. R. Booth, warning against 'monster sewers, impregnated with the feculent matter of each locality' because of their capacity to carry 'the seeds of disease ... from house to house, from street to street, from unhealthy parts to salubrious districts' (2008: 43). By this account, sewers are little better than a sanitary Trojan horse, apparently beneficent but in fact effortlessly, insidiously introducing a mortal enemy into the heart of the domestic citadel.

Sewer gas was not only a subtle and dangerous domestic infiltrator, a threat from the exterior, it was also an internal threat, originating with the house's own inhabitants and at risk of returning to haunt them. Many such dangers were quite literally of home-dwellers' own making: 'emanations from the human body, and the expirations from the lungs', wrote William Whitty Hall, have the most rapid deteriorating effect on air quality (Hall 1861: 18). 'We ourselves render the air around us impure', wrote Dr Andrew Wilson, in *Home Notes*. 'From our lungs and skin, we are perpetually giving forth waste products to the air, these products being the result of our bodily work. *We are, therefore, a constant source of danger to ourselves and others*' (Wilson 1894: 263; my emphasis).

This sense of a closed circle of domestic danger, arising from and threatening the safety of the self, informs much domestic sanitarian work, and prompts Richardson to urge readers to 'take care that every impurity formed in the house is removed as it is formed' (1886: 191), for when impurities linger, they accumulate and decay, setting in train the process of miasmatic disease. Household dirt is to a large degree of householders' own making: their own waste, inadequately banished, is always in danger of returning. The perspective afforded by such a position was alarming. Phillis Browne, in a chapter on house-cleaning in the compendious *Our Homes*, emphasized the importance of daily cleaning by reference to the 'melancholy fact that we all communicate impurity to material objects by our touch, and even by our presence'. She elaborates: 'If we could put the contents of the housemaid's dust-pan under a powerful microscope, we should find that a considerable portion of the dust collected there was made up of organic particles – hair, scurf, little pieces of skin, nail-clippings, &c. &c. – the result of the presence of the inhabitants of the house' (Browne 1883: 871).¹² However distasteful

this might have been, the microscopic bodily detritus Browne describes is at least safely contained in the housemaid's dustpan.¹³ In Dr Schofield's account of this phenomenon, however, dust is nowhere near as docile, and he evinces a rather vengeful relish at the thought of fastidious people unwittingly inhaling what he calls an 'aërial sewage' of their own making:

The breathed air of a room is filled with swarms of bacteria, with thousands of dead dried-up body-cells from the skin, and much decaying animal matter that altogether may fitly be called aërial sewage; so that it is a fact that the most fastidious people whose person, linen, and food must be scrupulously clean, are content to breathe air so foul that it can only be compared to the Thames at Blackwall; simply because the dirt is not easily seen. ([1889?]: 149)

Schofield graphically conveys a sense that the threat of filth within the house was as great as that without. The genteel living room was as disturbingly and filthily unhealthy as the Thames east of the city, the ultimate destination of London's sewage.¹⁴

With its reference to bacteria, Schofield's model of disease relies on germ theory, which was gradually but steadily gaining scientific credence. Richardson, in contrast, lived and died a confirmed miasmatist, quite unpersuaded of the merits of germ theory – or 'hypothesis' (1897: 449), as he dismissively terms it – even though by the end of his life it was gaining universal scientific acceptance. Nonetheless, however revolutionary this theory ultimately proved to be for the conceptualization and treatment of disease, it made strikingly little difference to the sanitarian advice delivered by its adherents or detractors. Schofield and Richardson disagreed profoundly on the nature of disease transmission, but were as one in their analysis of the dangers of household dirt. Human beings constantly foul their own nests by shedding bodily waste; these residues take the form of dust; and that dust, however ordinary, is a hazard. 'Whenever a room is dusty, it is unhealthy. When a room is packed with furniture that is capable of holding and retaining ordinary dust, it is unhealthy', wrote Richardson (1883: 26), and Schofield observes grimly the 'injurious' effects of his 'aërial sewage' ([1889?]: 149).¹⁵

While general acceptance of germ theory at the turn of the century did not immediately initiate a revision of the dangers of household dirt, the identification of the bacterium did nonetheless allow an even more precise and terrifying picture of invisible domestic filth to emerge. In a 1906 article on flock beds (the cheapest form of mattress, usually made from old rags), Peter Fyfe, Glasgow's chief sanitary inspector, reported that experiments had shown that 'one gramme of Glasgow crude sewage contains an average 197,500 bacteria, but ... in the selected gramme of the Glasgow bed the vast number

of 22,100,000 were found' (1906: 720). Previously, people had grappled with 'their natural enemies under the simple long-familiar names of "dust" and "dirt"', but now, with the discovery of the many varieties of bacteria, the threat posed by dirt was not only nameable, but also countable (Cutler 1907: 78). If a sewer contains fewer pathogens than a mattress, then the home has surely sunk as low as it can get on the scale of purity and security. Thomas Pridgin Teale had told his readers in 1884 that 'very few houses were safe to live in' (1884: 3); Fyfe's analysis puts alarming statistical flesh on the bones of this contention.

Domestic danger was generated by waste from the house-dwellers' own bodies, exacerbated by the very sanitary appliances designed to eliminate it, and conceived in the matrices of air and water, two of the elemental and indispensable foundations of human life. This account results in a strange and unsettling conceptual commingling not only of the body and its dwelling – Chadwick proposed an 'arterio-venous system of water supply and sewage disposal' (Bynum 2008: 82), Richardson refers to the body as 'the living house' (1887: 188), and Robert Edis wrote of 'furnishing a house with ready-made clothing' (1883: 350) – but also of the pure and the impure, that which sustains life and that which destroys it.¹⁶ In some ways, there was nothing new about this. Neither water nor air had ever been available simply as a symbol of purity: water had for centuries been considered dangerous to drink, hence the reliance on small beer as a thirst-quencher; and miasmatic theory, the standard explanation of disease transmission since the time of the Greeks, relied on a theory of invisible air-borne infection (Bynum 2008: 75–8; Smith 2007: 98; Worboys 2000: 38–42). But the ever-closer convergence of health and domestic hygiene promised by the sanitarians, the belief that rigorous systems of cleansing the home would deliver improved health, and the consequent outpouring of sanitarian advice, with its intense scrutiny of every element of household equipment, suggest that the optimism of the domestic sanitarians – their ambition to design disease out of the environment – was at least accompanied by, if not founded in, raised levels of anxiety about where exactly safety ended and danger began. Domestic sanitarian advice was premised on the understanding that the boundary between cleanliness and dirt, safety and danger, was not tidily or permanently located at the front door. Rather, the threshold between the two was inside the home, and needed to be repeatedly reinscribed and ceaselessly policed. Phillis Browne made clear the Sisyphean character of the task: 'The moment which finds a room perfectly clean is the moment in which it begins to get dirty again. ... The fight must be waged without intermission, and the moment of rest is the moment of defeat' (Browne 1883: 869). More was at stake in this struggle than simple good health: 'Where dirt has been driven out', she continued, 'purity and enlightenment have found a congenial home; and it has always been found

that to become clean is to take the first step in becoming good, wise, and great' (ibid.). The elimination of dirt is a route not only to health, but to a morally virtuous, even quietly heroic, self – but, of course, also a self whose status was precarious because it was in need of constant reconstruction, as the elimination of dirt could never be definitively achieved.

In response to threats within the home, domestic sanitarians recommended their elimination via the dual application of vigilance and science. Through the work of Richardson and others, the bourgeois dwelling became increasingly subject to the critical gaze of the expert, and women were the main addressees of their advice, in part because of their traditional responsibility for health in the home, and in part because they were already managers of the domestic environment. Schofield's habitually abrasive tone governs his approach to the matter, as he seeks to shame women into undertaking their sanitary responsibilities more diligently:

The present state of ignorance amongst women – to whose lot most of the domestic hygienic work of the world must necessarily fall – is appalling, and nothing less than an anachronism. ... we see amongst the vast majority an apathy and an ignorance worthy of mediaeval times, that are difficult to rouse or to reach, and that make the present effort to establish the teaching of hygiene to women on a systematic basis partake of the character of a forlorn hope. ([1890?]: 7)¹⁷

For Schofield, domestic hygiene is a marker of modernity, and ignorance of it a sign of a 'medieval' lack of enlightenment. Where Schofield scorns and cajoles women, Richardson flatters their special fitness for the task, their expertise gained through intimate familiarity with their domestic environment, rallying them to join forces with the domestic sanitarians:

The men of the house come and go; know little of the ins and outs of anything domestic; are guided by what they are told, and are practically of no assistance whatever. The women are conversant with every nook of the dwelling, from basement to roof, and on their knowledge, wisdom, patience, and skill, the physician rests his hopes. (*Sanitary Record* 7, 13 July 1877: 25)

Phillis Browne preferred a straightforward military metaphor: 'Women – mistresses of households, domestic servants – are the soldiers who are deputed by society to engage in this war against dirt' (1883: 869). Whether shamed, flattered or recruited into action, women's domestic responsibilities were twofold: to detect and correct the errors made by architects, builders and plumbers, and to equip the house in accordance with the experts'

recommendations.¹⁸ Gendered notions of expertise and responsibility, a line of command running from the scientifically informed professional to his female lieutenant in the home, were at the heart of the convergence of discourses of health and domestic responsibility, as the male experts recruited women to enact their recommendations and patrol the domestic frontiers.

It was from this position that Richardson, Murphy, Edis and others turned their attention to the home, and began the work of making it healthy. Like all sanitarians, Richardson's main focus was on natural light, clean water and pure air as the basic requisites of the healthy home. Each of these was given due importance. The health benefits conferred by water ranged from a recommendation that more people might consider adopting an innovatory practice currently found in 'very cleanly families' – hand-washing after using the water-closet, 'a really excellent custom' (Richardson 1886: 64) – to proposing that seawater be piped from the coast to the capital so that all might enjoy the benefits of ozone:

If sea-water were brought in quantity to London it might, by a most simple method, be diffused at pleasure as fine spray in all houses and in close courts and alleys, so as to impart a cool sea air throughout the whole of the metropolis, an influence which would be as agreeable as it would be salubrious. (Richardson 1880: 5.570; original italics)

The scale and ambition of such a proposal might seem to belong to the world of domestic sanitarian utopian fantasy – and, indeed, Richardson had published just such a book: *Hygeia: A City of Health* (1876) became one of his best-known publications. This recommendation, however, was actually published as part of the 'Health at Home' series, alongside recommendations for household deodorizing fluids. The domestic sanitarian agenda was not always as modest or localized as the recommendation of hand-washing or the avoidance of dust traps.

In the bedroom, water played its part in the maintenance of a hygienic environment. Carpets, heavy drapes or blinds at the windows, curtains round the bed, flat-topped cupboards: all harboured dust and dirt, and the curtains also hindered ventilation, so all had to go.¹⁹ Equipping the bedroom was only half the battle, however. Its constant scrutiny and rigorous cleaning was equally important. Walls and floors must be frequently washed, and all woodwork painted or varnished for easy cleaning. The bedstead itself 'should be constructed of metal, of iron or brass, or a combination of these metals. Wooden bedsteads are altogether out of date in healthy houses. They are not cleanly, they harbour the unclean, and they are not cleansable like a metal framework' (Richardson 1880: 3.286). Vermin (bedbugs, lice or fleas) lodged in wood's cracks and crevices, and these bedsteads could

not be satisfactorily washed and disinfected.²⁰ It was as one of many such hygienic considerations that Richardson made his intervention against the double bed.

It was to air, however, that sanitarians gave the most attention. Capable of bestowing health and vigour, air could also deliver disease and infirmity, and so was the object of hundreds of thousands of words of domestic sanitarian advice. All agreed that good ventilation was the *sine qua non* of the healthy bedroom, and a few were content to leave this to an open window. In his book *Sleeplessness* ([1879?]), the doctor and homeopath F. G. Stanley-Wilde thought it 'a happy and healthful practice to become accustomed to sleep with the window open the whole year round' ([1879?]: 17), and social and health campaigner Ada Ballin made a similar case: 'Bedroom windows should be thrown wide open every day, and even at night, except in the severest weather, the windows should be kept slightly open' (*Home Notes* 7 April 1894: 356). But open windows could create as many problems as they solved. As well as fresh air, they were likely to admit draughts and damp air; both risked inducing disease (Richardson 1883: 17, 14). Richardson therefore preferred that air be admitted 'from the outside of the house, through a conduit, to a chamber at the back of the fire-stove; and warmed there to 60° to 65° Fahr., it should pass by a separate conduit towards the upper part of the room, to be admitted through the wall into the room' (1883: 30). The home required mediated access to the purer outside air in order to avoid the worst excesses of inhaling impurities.

To vanquish draughts and ensure the circulation of fresh air, scores of patent devices, including stoves, valves, vents, shafts, flaps, pipes and perforated bricks, were manufactured, their various merits and demerits debated and critiqued.²¹ Some were simple, involving no more than the adaptation of a sash window with a block of wood (the Hinckes Bird system). Others involved the installation of vents and pipes, such as the popular Tobin tube and the Sherringham, Watson or McKinnell ventilators.²² For the drawing room, Richardson, Teale and Edis all mention Mrs Priestley's 'simple and elegant method of ventilation' (Richardson 1883: 31), which introduced fragrance as well as fresh air: the window space was fitted with 'two light folding glass doors. Between these doors and the sash of the window flowers are placed, and when the lower sash of the window is raised a little distance, the air passing up through the flowers ventilates over the half window-doors into the room' (ibid.).²³ This 'Floral Art Ventilator', which also featured at the 1884 International Health Exhibition, had the advantage not only of being 'pretty and decorative' and of introducing fresh air, but also of using plants and flowers to filter the air, thereby removing the 'ammoniacal and carboniferous impurities' (Edis 1883: 362; see too *Health Exhibition Literature* 1884: 246). Many of the anxieties about foul air contrasted the filth of the city air with that

of the countryside, so Mrs Priestley's system had the further advantage of combating the evils of the former with the natural powers of the latter.²⁴

As important as the admission of fresh air to a room was the matter of how best to remove it once it had become impure. Such air was usually referred to as 'vitiated' or, by Richardson, as devitalized. Vitiating – corruption or spoiling – might result from infiltration by sewer gas or from fumes given off by gas lights, but in the bedroom it was simply the result of breathing: 'The atmosphere of any ordinary chamber occupied by more than one sleeper, is speedily vitiated, and ... in this vitiated condition, it is breathed over and over again'; this 'impairs the general health and undermines the constitution' (Hall 1861: 19). In air vitiated by respiration, Wilson reports in his *Handbook of Hygiene*, 'the effete matters thrown off ... are carbonic acid, watery vapour, and certain undefined organic substances' ([1873] 1883: 66).²⁵ For Wilson it is not just that air itself becomes vitiated but that the very gases it comprises are designated 'effete' – exhausted, depleted, worn out.²⁶ Richardson's theory relies similarly on a language of depletion. In devitalized air, he writes, 'the supporter of animal life, the oxygen itself, is under a physical change of condition, by which it is losing its special sustaining faculty, and is becoming, by negation, a poisonous agent' (1883: 19). The dangers of breathing such air, Wilson writes, 'have not yet been determined with sufficient accuracy', but he reminds readers that 'even a small excess of carbonic acid interferes with healthy physiological action' ([1873] 1883: 68-9). And, he warned, the invisibility of such poisonous matter does not reduce its insidious danger:

It does not follow that, because pain or discomfort is not always experienced in a vitiated atmosphere, no harm has been done. The effects may be slowly and imperceptibly cumulative, but they are none the less injurious, and they are now recognised as being amongst the most potent and wide-spread of all the 'pre-disposing causes' of disease. (ibid.: 69; see too Schofield [1889?]: 149–50)

Those breathing vitiated air might not suffer from any definite form of disease but from persistent 'malaise without being laid up, ... pale, easily wearied, dull in spirit'; worse still, 'houses which are charged with impure atmospheres are the places in which the septic diseases are most likely to be intensified' (Richardson 1883: 20, 21). Douglas Galton, writing about 'Warming and Ventilation' in *Our Homes*, agreed, suggesting that 'there are still thousands of private houses ... so deficient in a proper quantity and quality of air and light, as to render them breeding-nests of consumption, rheumatism, and other forms of disease' (1883: 485). Air is the matrix of health and of disease, the invisible, unstable but potent interface between the domestic environment and its vulnerable but toxic inhabitants.

Vitiation, devitalization, effeteness: the vocabulary of advice about ventilation is one of exhaustion and diminution as much as of corruption, toxicity and degeneration. It is driven by two different conceptions of the danger: first, the imminent depletion of air's health-giving properties and, second, their replacement by the invisible toxic waste of exhaled breath. Bankruptcy and corruption are the twin evils of foul air, always imminent, always proceeding together, an enemy generated from deep within the human subject and whose stealthy return from banishment has the power to undo him or her.

Since air is always in the process of being rendered impure, there must be a system for its ceaseless removal and replenishment. Its elimination should be the environmental continuation of the act of exhalation – the indispensable sequel to the last inhalation and the precondition of the next. How, though, might this best be achieved? Most thought that an open chimney flue was the readiest means: *The Housewife's Reason Why* reminded readers that 'the chimney acts to the room as the wind-pipe does to the human body; when, therefore, the chimney place is stopped up, the room is, as it were, *incapable of breathing*, or of passing off the vitiated air which has been generated' (Philp 1857: 275; original italics). To close a flue was tantamount to suffocating both house and home-dweller. Lady Barker, writing at the high point of domestic sanitarianism, felt able to 'take it for granted that every one understands the enormous importance of having a fireplace in each sleeping-room in an English house, for the sake of ventilation afforded by the chimney' (1878: 2), although this was often put in jeopardy by the 'cussedness' of housemaids who insisted on shutting the flap of the register stove – hence the need for ceaseless vigilance by the lady of the house.²⁷

Just as there were fittings and appliances manufactured to aid the influx of fresh air, so too there were for its removal once vitiated. As well as grates, tubes and vents for individual rooms, there were also elaborate whole-house ventilation systems promising continuous air flow, with minimum draught and damp. Two Liverpool doctors, Drysdale and Hayward, designed and built houses to demonstrate their ventilation systems. Air, heated in a chamber on the ground floor, filtered up through the house; once vitiated, it was drawn into a foul air chamber in the attic, and emptied via a connection back to the smoke flue from the kitchen fire (Drysdale and Hayward 1890). Robert Renton Gibbs, also from Liverpool, proposed a system combining heating and ventilation: air from the outside was admitted to rooms via vertical ventilation tubes, and filtered, warmed air was introduced into the central hall which then rose and ventilated every room, the used air again collecting in a foul air chamber under the roof (Galton 1883: 603). If for Richardson the body was a 'living house', here the house is an organism whose health, inseparable from that of its inhabitants, is guaranteed by a constant intake of fresh air and expulsion of foul.

Fixtures and furnishings also contributed to the processes of ventilation. Robert Edis recommended a ventilating letter-box (1883: 361), and Renton Gibbs's house plan shows that cabinets in the hall concealed coils to heat the circulating air, as did the billiard table (Galton 1883: 603–4). But bedsteads too attracted the attention of the ventilation engineer. If bedrooms were particularly liable to become repositories of foul air, beds too were in danger of trapping injurious bodily emanations. Phillis Browne quotes the words of Florence Nightingale to make her case for the airing of beds:

If you consider that a grown-up man in health exhales by the lungs and skin in the twenty-four hours three pints at least of moisture loaded with matter ready to putrefy ..., just ask yourself next where does all this moisture go to? Chiefly into the bedding, because it cannot go anywhere else. And it stays there. (1883: 873)

Air was necessary to the bed as well as the bedroom.

The ingenious solutions to the vitiation of household air offered by the Tobin tube, the Hinckes Bird ventilator or Mrs Priestley's Floral Art Ventilator were matched by a device specific to the bedroom called the O'Brien's Bed Ventilator (Figure 2). The intention was to remove the risk of heavy bedclothes wrapping the sleeper up 'in his own cutaneous exhalations' by ventilating the bed while he slept. Richardson described the ventilator with enthusiasm:

A tube of two inches diameter at the foot of the bed opens just under the bed-clothes; it passes beneath the frame of the bed to the bed's head, and runs up at the bed's head until it nearly reaches the ceiling, or when convenient passes into a flue. Through this tube a current of air, entering the bed at the upper part and passing over the sleeper, is made to circulate out of the bed by the ventilating tube, carrying with it the watery matter that is exhaled by the skin, and keeping up, in fact, a perfectly ventilated space I consider the O'Brien tube to be a marked hygienic improvement in the construction of bedsteads and bedding. It ought to be fitted to every bedstead. (1880: 4.383)

By making the bed itself an integral part of the technology, the O'Brien tube came as close as it could to plumbing the sleeper directly into the ventilation system already at work in the room. The tube transforms the warm, perspiring body of the sleeper into the engine driving the apparatus: 'By taking advantage of the high temperature and consequent expansion of the heated noxious gases and vapours surrounding the occupants of beds ... these can escape from under the bedclothes into the outer air' (*Medical Times and Gazette* vol. 2, 28 August 1880: 253). The 'gases and vapours' emitted by sleeper's body

FIGURE 2 *O'Brien's Bed Ventilator.*

are warm and so are drawn along the tube and discharged at a safe distance from the vulnerable sleeper. Ingeniously, the sleeping body is both the source of the problem and its solution; it produces impurities, and it generates the power to drive the technology that removes them. Together, body and machine fulfil in the most immediate manner imaginable Richardson's counsel that the bedroom be 'a sanctuary of cleanliness and order, in which no injurious exhalation can remain for a moment, and no trace of uncleanness offend a single sense' (1880: 3.287).²⁸

Intended by its inventor for use in hospitals, Richardson considered O'Brien's Bed Ventilator equally appropriate for home use: 'It ought to be fitted to every bedstead' (1880: 4.383). Phillis Browne, offering advice on the airing of beds, quotes the words of the hospital reformer Florence Nightingale on the emanations of patients. Correspondence between the domains of home and hospital was, as Alison Bashford notes, increasingly common, with

sanitarian discourse eroding the conceptual distinction between the two: she quotes John Simon, the Chief Medical Officer, who in 1863 wrote that 'that which makes the healthiest house makes the healthiest hospital, – the same fastidious and universal cleanliness, the same never-ceasing vigilance against the thousand forms in which dirt may disguise itself' (Bashford 1998: xi). Both home and hospital were places in which disease was constantly threatening, dirt the enemy, hygiene the means to combat it and health the reward. Science and technology were strategic aids to be deployed in the service of a health-bestowing cleanliness. The sanitarian vision relied on deploying complexity in the service of simplicity. Its utopian ambition was of perfected human health resulting from the mobilization of a scientific knowledge and technological ingenuity that would allow the simple and elemental forces of sunlight, pure air and fresh water to cleanse, protect and preserve humanity from the dangers they posed to themselves.

O'Brien's Bed Ventilator brought the sanitarians' ideal of the scientific bed one step closer. However, the device seems to have been a short-lived enthusiasm for Richardson, for by the time 'Health at Home' was revised and republished six years later as *Household Health*, all mention of it had gone. What survived the revision, however, was another more enduring technology of bedroom aeration: namely, twin beds. Richardson announced his advocacy of what he called 'the single-bed system' as a safeguard for vulnerable co-sleepers' health, each at risk from the vitiated air exhaled by the other:

At some time or other the breath of one of the sleepers must, in some degree, affect the other; the breath is heavy, disagreeable, it may be so intolerable that in waking hours, when the senses are alive to it, it would be sickening, soon after a short exposure to it. Here in bed with the senses locked up, the disagreeable odour may not be realised, but assuredly because it is not detected it is not less injurious. (1880: 3.286)

O'Brien's Bed Ventilator was designed to remove moist air from collecting around the sleeper; twin beds were designed to distance fellow sleepers from the impurities of another's breath. A double bed exposed a sleeper to the exhaled breath, the vitiated air, of his or her bedfellow, their proximity combining with their unconscious state to render them vulnerable to the toxins expelled in malodorous breath – a phenomenon both disagreeable and injurious. If the house was a potential death trap, for Richardson the bed was doubly so, for active vigilance was necessarily suspended when the senses were 'locked up' in sleep. Unconsciousness brought with it unwariness and vulnerability. It was safer to be alone in the arms of Morpheus than to double up with one's spouse. Single beds, with a channel of untainted air running between them, structured reassurance and safety into the dangerous territory

occupied by proximate co-sleepers. Moreover, by designating this 'the single-bed system', Richardson endowed his choice with the gravitas of systematicity, with its implicit promise of the scientifically informed elimination of the chance eruption of disease.

Richardson's advocacy of twin beds did not go unnoticed. A reviewer of 'Health at Home' in the *Ragged School Union Quarterly Record* included in its summary of key points that 'it was of the greatest importance in a healthy home to let every person have a separate bed'. The advice was underlined by offering evidence of the beneficial consequences: 'The important results arising from each having a separate bed had been shown at the Industrial Schools at Anerley, where each scholar had his or her own bed. The mortality had been reduced to three in 1,000 annually' (*Ragged School Union Quarterly Record* July 1880: 107).²⁹ Other writers picked up on Richardson's work. The Scottish journalist, author and publisher Alexander Hay Japp reiterated both Richardson's unease and his solution: 'Such a thing even as a double Bed, should not exist ... the single Bed must once more have the preference'. Quoting Richardson at length, Japp argued that the advantage of single beds was that sleepers did 'not inhale each other's "breathed breath"' (1885: 87–8).³⁰ The dictates of hygiene in the service of disease control led these commentators to find bed-sharing a source not of intimacy and comfort, but of pollution and danger, in the face of which the health of the individual could best be assured by demarcating his or her individuality more clearly through physical separation.

Richardson was not the first to recommend twin beds as an aid to health. A century earlier, the celebrated entrepreneur and quack physician James Graham – best known for his 'Celestial Bed', which was enlivened with an electrical charge and rented out at £50 a night to couples eager to reap the procreative and pleasurable rewards he promised them – had inveighed against couples 'pigging together' night after night, and advised that better health as well as improved marital regard would result from 'two beds in the same large room' (1783: 11).³¹ But while Graham's had been a lone voice, Richardson was just one among a growing body of physicians and commentators convinced of the health benefits of twin-bedded sleep. In the same year that the 'Health at Home' series was published, the phrenologist and 'hygienic practitioner' (he practised the popular 'water cure') R. B. D. Wells reached similar conclusions to Richardson: 'Air once breathed is unfit to be breathed again until purified', he wrote, and this was one reason why 'as a rule two persons should not sleep together in the same bed' ([1880?]: 61, 378).³² In America, William A. Alcott had, in 1866, recommended separate beds for couples when the woman was pregnant: 'Are we doing our duty when we suffer her to sleep in a narrow, unventilated bed-room, especially during the later months of her seclusion?', he asked, 'and does it add to the purity of the air she is to breathe

to have others occupying the same bed, and using up one half or more of the natural supply of oxygen which God, in his Providence, has designed for her?' ([1866] 1972: 176). Another American, the physician, minister and health campaigner William Whitty Hall, published *Sleep: Or the Hygiene of the Night* simultaneously in New York and London in 1861, announcing in his Preface that the aim of the book was

to show that as a means of high health, good blood, and a strong mind to old and young, sick or well, each one should have a single bed in a large, clean, light room, so as to pass all the hours of sleep in a pure fresh air, and that those who fail in this, will in the end fail in health and strength of limb and brain, and will die while yet their days are not all told. (Hall 1861: n.p.)³³

'Sleeping together as a habit', he argued, exposes co-sleepers to the toxic perils of vitiated air night after night, and 'is a sufficient cause for a gradual diminution of bodily vigor, a gradual undermining of the constitution, and an inevitable cause of premature decline and death to multitudes' (ibid.: 51). Consequently, sleeping separately was an 'absolute necessity to health' to avoid the accumulation of 'destructive human emanations' in the bedroom, towards which end 'the two first steps ... [are] large rooms and separate beds' (ibid.: 108).

For Richardson, Japp, Wells and Hall, twin beds were part of a broader, scientifically underwritten health regime of which hygiene was the rationale, the cornerstone and the method. As the air swam with invisible particles of toxic dust, as the sleeping body emitted its invisible but deleterious vapours, as the concentration of carbonic acid stealthily increased through the course of the night, further vitiating the already compromised air of the bedroom, their unanimous advice was to seek security in solitude, buffered against the depredations of one's fellow sleeper. The forces of health and hygiene, combined in a ceaseless daily struggle against disease, took their nocturnal rest separately, in twin beds.