

The Paris sewers and the rationalization of urban space

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Sewers are perhaps the most enigmatic of urban infrastructures. Most citizens of modern cities are aware of their existence, yet few could accurately describe their layout or appearance. This paper takes as its starting point a key moment in the cultural representation of urban space: the photographs of the Paris sewers taken by Félix Nadar in the early 1860s. These images capture a dramatic transformation in subterranean Paris, initiated in the early 1850s by Baron Georges Haussmann and his chief engineer Eugène Belgrand as part of the comprehensive reconstruction of the city's infrastructure during the Second Empire of Napoléon III. This paper argues, however, that with respect to the underground city, we cannot consider the Haussmann era to be the unproblematic epitome of modernity. The reconstruction of subterranean Paris revealed a series of tensions that were only to be resolved in the post-Haussmann era in response to the combined influence of growing water usage, the persistent threat of disease and changing conceptions of public health policy. It is concluded that the flow of water in Second Empire Paris is best conceived as a transitional phase in the radical reworking of relations between the body and urban form engendered by the process of capitalist urbanization.

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Introduction

... un enchevêtrement difforme de sentines et boyaux à défier l'imagination de Piranèse. (Félix Nadar)¹

Les grands égouts de Paris ont toujours préoccupé l'attention publique et ont été honorés des plus illustres visites. Il n'est pas un souverain étranger, pas un personnage important qui ait quitté Paris sans avoir visité les collecteurs. (Eugène Belgrand)²

The rebuilding of Paris between 1850 and 1870 is a crucial moment in urban history. The attempt by Emperor Napoléon III and his Préfet de la Seine, Baron Georges Haussmann, to rationalize urban space is one of the formative legacies in the development of urban planning. For Frederick Hiorns, the Second Empire reconstruction of Paris was a time in which,

the evils of long-continued civic neglect were redeemed and Paris placed in the forefront of modern cities by imaginative reforms applied to the most onerous of human problems.³

Edmund Bacon echoed similar sentiments in describing the new spatial structure of Paris as a

reversal in the direction of energy, from the outward explosion of avenues and palaces of the Louis Kings to the implosion of the connecting and life-giving boulevards of Haussmann.⁴

For many authors, the Haussmann era has been read as axiomatic of modernity; yet the reality is far more complex, involving an interweaving of ideas and developments spanning both modern and pre-modern conceptions of urban form.⁵ In fact, as this paper will show, the flow of water in Paris did not

become modern, in the sense that we would now recognize, until after the fall of the Second Empire, with new legislative developments in the 1890s in response to rising water usage and the continuing threat of cholera. One of the least studied of these extensive public works projects is the reconstruction of the Paris sewers.⁶ This paper describes how the reorganization of subterranean Paris held implications far beyond the modernization of drainage and sanitation. Metaphors of progress and the application of scientific knowledge became entangled with wider cultural and political developments surrounding the transformation of nineteenth-century Paris.

Sewers enjoy a special place in the pantheon of urban mythology. They are one of the most intricate and multi-layered symbols and structures underlying the modern metropolis, and form a poignant point of reference for the complex labyrinth of connections that bind urban space into a coherent whole. Sewers have long been used as metaphors for the hidden worlds of crime, poverty and political insurrection, and there is a rich legacy of representations ranging across literature, cinema and music.⁷ In *Les misérables*, perhaps the most famous literary evocation of the underground city, Victor Hugo depicted the Paris sewers of the 1830s as 'the evil in the city's blood', a place where the poor and the outcasts of society lurked together as a threatening formation for the world above ground.⁸ This paper develops a rather different perspective from the genre of urban horror, by emphasizing how sewers have also been portrayed as symbols of progress. Sewers are considered in this context as an integral element in the emergence of what the architectural historian Anthony Vidler terms the 'technical ideology of metropolis'.⁹ Just as sewers are repeatedly associated with dirt, danger and the unseen, they are also physical manifestations of new patterns of water usage, bodily hygiene and the progressive application of new advances in science and technology. Rosalind Williams traces a similar theme through her exploration of the symbolic and metaphorical meanings attached to underground technologies in modern societies. For Williams, the growing scientific and technological sophistication of the built environment necessarily alters our relation with nature and the organic world. She emphasizes the poignancy of the vertical axis to our understanding of the cultural appropriation of urban technologies, since the subterranean environment is not

only a technological construct, but also 'a mental landscape, a social terrain, and an ideological map'.¹⁰

The search for spatial order has been an integral element in the contradictory experience of modernity, yet, hidden within the more progressive conceptions of urban transformation lie the ideological trappings of imperial and pre-modern conceptions of social and elemental harmony. This paper argues that the process of 'Haussmannization' was predicated on a holistic conception of the relationship between the body and the city, which drew on a series of organic analogies to compare the new city with a healthy human body:

These underground galleries would be the organs of the metropolis and function like those of the human body without ever seeing the light of day. Pure and fresh water, along with light and heat, would circulate like the diverse fluids whose movement and replenishment sustain life itself. These liquids would work unseen and maintain public health without disrupting the smooth running of the city and without spoiling its exterior beauty.¹¹

The material presented here, however, suggests that the circulatory dynamics of economic exchange were to overwhelm organic conceptions of urban order and institute a new set of relationships between nature and urban society. By tracing the history of water in urban space, we can begin to develop a fuller understanding of changing relations between the body and urban form under the impetus of capitalist urbanization. This interdisciplinary task involves exploring changing relationships between the body, architecture and ideological conceptions of nature as part of a broader project to expand our understanding of modern cities and their cultural meaning.¹²

The paper begins with an examination of the photographs of the newly modernized Paris sewers, taken by Félix Nadar in the early 1860s. These images are used to introduce a series of ideas surrounding progress, modernity and the aesthetic representation of the modern city. It is suggested that Nadar's photography, and his passionate advocacy of the progressive potential of technological innovation in society, hold important implications for our understanding of the often-contradictory dynamics behind capitalist urbanization. Secondly, the reconstruction of the subterranean city is set in its broader political and historical context, in order to draw out some of the tensions inherent in the drive to modernize urban

space. It is argued that these contradictory dimensions to the control of water were only satisfactorily resolved in the post-Haussmann era. Such complexities are traced to the rapid growth of Paris and the growing consumption of water for washing and bathing in private dwellings, which led to a breakdown in pre-modern conceptions of the organic cycle linking the body and the city. The representation of riparian urban leisure in the art of Seurat is used to delineate the emergence of a distinctively 'metropolitan' experience of nature. Finally, the paper considers how the reconstruction of subterranean Paris involved the reworking of corporeal metaphors in the development of aesthetic sensibilities towards urban infrastructure. These changes are related to wider developments in French society, including the sharpening sense of self-identity under modernity in the context of widening social and economic polarities across the city. It is suggested that the sewers form an enduring element of the 'urban uncanny', through their integral interrelationship with changing conceptions of bodily abjection and urban order.

Photographing the Paris sewers

Among the strangest images we have of nineteenth-century Paris are the underground photographs of Félix Nadar (1820–1910). The photographic legacy of Nadar provides a remarkable record of the complex and often contradictory interweaving of political, technological and scientific developments underlying the rebuilding of Second Empire Paris. Nadar was born Gaspard-Félix Tournachon in Paris in 1820, just two years before Nicéphore Niépce (1765–1833) began the first experimentation with photography (using a bitumen ground technique on pewter and glass). Following a brief spell as a medical student in the late 1830s, Nadar began to devote increasing energy to literary and political pursuits. In the 1840s, Nadar worked on the republican daily *Le Commerce* and also as a cartoonist for the satirical journals *Le Corsaire-Satan* and *La Silhouette*.¹³ The political turmoil of 1848, and the subsequent coup that brought Napoléon III to power, were to have a decisive impact on Nadar, along with many of his contemporaries. With the utopian and revolutionary Left greatly weakened, there was now a growing divide between the romantic attachment to artisan labour and newer political ideas that

embraced technological change.¹⁴ Nadar looked increasingly to a dynamic and progressive combination of science and politics as the most realistic means to transform society. In 1856, for example, he published a collection of stories, *Quand j'étais étudiant*, dedicated to the socialist writer George Sand. In these stories, he brought together a number of his main concerns: the power of science and medicine to dispel death, disease and ignorance; a sense of society in a state of rapid and chaotic change; and the power of reason to bring about both individual and collective advancement.¹⁵ Under the repressive regime of Napoléon III, Nadar turned increasingly to the use of satire and allegory as a vital means of expression under the tight censorship and surveillance of the time. He soon established his reputation as a novelist, journalist and caricaturist, and worked closely with the radical publisher Charles Philipon on his satirical papers *La Caricature*, *Le Charivari* and *Le Petit Journal pour Rire*.¹⁶

From the late 1840s onwards, Nadar began to take an increasing interest in photography. In 1854, he set up his own studio under the direction of Adolphe Bertsch and Camille d'Arnuad. The poor sales of his last major lithographic venture, the *Panthéon*, must also have encouraged Nadar to focus his energies on the new medium of photography. Nadar's reputation for portrait photography developed rapidly, and he was soon able to charge some 100 francs a sitting: Charles Baudelaire, Claude Debussy, Gustave Doré, Hector Berlioz and many other leading cultural and political figures of the time had their portraits taken at his Paris studios.¹⁷ Nadar became convinced of the status of photography as a new art form equal to that of painting, which was, moreover, uniquely capable of capturing the ephemeral and fragmentary qualities of modern life. With photography, he was able to convey images with unprecedented speed and accuracy, introducing an extraordinarily intense kind of realism into the aesthetic representation of Paris and its people.¹⁸ By the late 1850s, he had begun to gain international critical acclaim for his work, and, in 1858, filed a patent for the first aerial photography based on a series of urban panoramas taken from a hot air balloon.¹⁹

In 1861, Nadar sought to expand the medium of photography radically by transcending any reliance on natural light. In order to do this, he began making a series of underground photographs using electric light. The first outcome of this

experimentation was 73 views of the Paris catacombs, taken in 1861–62. In the winter of 1864–65, Nadar extended his underground work further by producing 23 photographs of the Paris sewers under the invitation of the city's chief water engineer, Eugène Belgrand (1810–78), who had been appointed by Haussmann in 1853 to oversee the reconstruction of the city's sewer system. The extension of photography into the underground city not only radically extended the possibilities for the meticulous visual documentation of hitherto unknown places and spaces, but reinforced the ambiguous role of modern technologies in providing an illusion of complete control and comprehension of complex urban societies. In photographing the sewers, Nadar contributed powerfully to new ways of seeing and understanding the city, by challenging a series of metaphorical axes ranging across light, cleanliness, verticality, knowledge and control.

When first shown, these unfamiliar images intrigued and astounded the French public. A completely new and strange world lying beneath the streets of Paris had been revealed: not a threatening and chaotic mass of tunnels, but a clean, well-lit network of structures at the leading edge of engineering science. In [Figure 1](#), we can observe a spacious, symmetrical and well-lit tunnel amenable to easy movement, observation and control. In [Figure 2](#), a mannequin is shown seated next to an example of the new sewer technologies introduced as part of the modernization programme (the lengthy 18-minute exposure time precluded the inclusion of a real worker). Before their improvement, the dominant imagery of the Paris sewers had been of an unexplored urban realm shrouded in darkness and mystery, a threatening maze beneath the streets of the city. Yet, as Maria Hambourg suggests,

in the photographs of the vaulted sewers, which might have conveyed the horrors of Piranesi's prisons, one sees rational structure and channelled cleanliness.²⁰

The sewers were no longer to be feared, but rather venerated and enjoyed as symbols of progress. Victor Hugo, for example, was quick to recognize that his imaginary representation of the 1830s sewers bore little resemblance to the new reality of the 1860s: 'The sewer today has a certain official aspect', he reflected, 'Words referring to it in administrative language are lofty and dignified . . . Nothing is left of the cloaca's primitive ferocity'.²¹

With the introduction of electric light into the sewers, the 'spectacle of enlightenment' now extended both above and below ground,²² as the new boulevards and shopping arcades had their subterranean counterpart beneath the city streets. The transformation of Paris made urban space comprehensible and visible to the public, thereby dispelling much of the opacity and heterogeneity of the pre-modern city. The Paris sewers were rapidly acknowledged to be 'unequalled in any other city in the world', and attracted a steady stream of international delegations of engineers and urban planners.²³ The subterranean photographs of Nadar played a key role in fostering the growing popularity of sewers and catacombs with middle-class Parisians, and, from the 1867 Exposition onwards, the city authorities began offering public tours of underground Paris.²⁴ Yet, as David Pinkney wryly notes, most visitors to the Paris sewers over the years have probably been disappointed to find,

not the dark and dangerous caverns through which Jean Valjean made his perilous escape in 1832 but the spacious, clean and well-lighted galleries of the Second Empire.²⁵

From city of mud to city of light

In order to understand the significance of Nadar's images, we need to explore the background to the transformation of the Paris sewer system. If, as Raymond Williams has suggested, the modern city becomes 'the physical embodiment of a decisive modern consciousness', then what do the Paris sewers tell us about changes in nineteenth-century French society?²⁶ The historical context to the reconstruction of Paris is well known. As early as 1827, an official report on the city's health had noted how 'the sense of smell gives notice that you are approaching the first city in the world, before your eyes could see the tips of its monuments'.²⁷ The population of Paris had increased from 786 000 in 1831 to over 1 000 000 by 1846. Growing congestion threatened to bring social and economic life to a standstill. The devastating cholera epidemics of 1832–35 and 1848–49 had spread panic in rich and poor quarters alike. And, by 1848, the Paris economy was also facing a deep downturn, a major factor behind the political turmoil that was to usher in the new regime of Napoléon III.²⁸



Figure 1 'The sewers' Félix Nadar (1864–65)

(Courtesy of the Caisse Nationale des Monuments Historiques et des Sites, Paris)

In June 1853, less than a year after his successful *coup d'état*, Emperor Napoléon III appointed Baron Georges-Eugène Haussmann as Préfet de la Seine, with responsibility for the reconstruction of Paris. Before his appointment, Haussmann had already acquired extensive public service in Vienne, the Gironde and the Var. More critically, though, he had lent vociferous political support to Napoléon III and closely shared his republican ideals, rooted in a powerful role for the French state.²⁹ Since no accurate map of Paris existed, one of Haussmann's first tasks was to undertake a detailed survey and

triangulation of the whole city. Napoléon III envisaged that the new Paris would be an imposing 'city of marble', worthy of comparison with Augustan Rome, and a lasting symbol of French international power and imperial ambition.³⁰ Haussmann was charged with the responsibility for transforming a congested medieval city into a dynamic modern metropolis. The changing role of Paris within the newly integrated national economy demanded an urgent transformation in the physical structure of the city. Central to the modernization of Paris lay a combination of faith in the application of scientific



Figure 2 'The sewers (sluice system)' Félix Nadar (1864–65)
(Courtesy of the Caisse Nationale des Monuments Historiques et des Sites, Paris)

principles with a programme of centrally directed public investment. The underused capital and labour behind the economic depression and political violence of 1848 were to be channelled into the reconstruction of the built environment through a deficit-financed economic strategy, rooted in Saint-Simonian ideas.³¹

By 1870, Haussmann had carried out some 2.5 billion francs-worth of public works through innovative debt financing equivalent to approximately 44 times the total city expenditure on all services in 1851.³² At the time of peak reconstruction, one in

five Parisian workers were employed in construction activity, and one-fifth of the Paris streets were rebuilt.³³ The programme of reconstruction required not only financial innovation but also a radical reorganization in the balance of political and economic forces in the city. Second Empire Paris was to grow out of the articulation of a general interest resting on the imposition of a new form of capitalist rationality, which was 'alien to the privatism of traditional property owners'.³⁴ For Anthony Saalman, the reconstruction of Second Empire Paris was the most influential

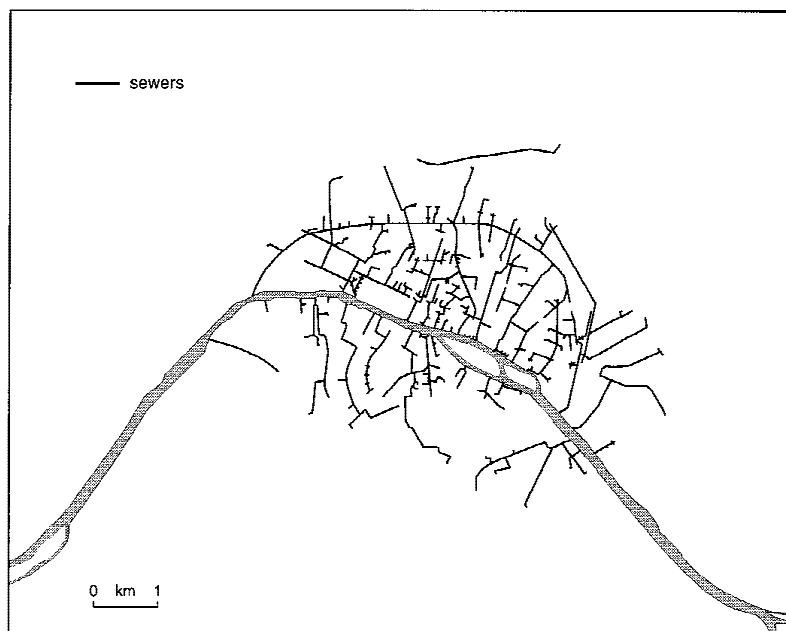


Figure 3 The Paris sewer network in 1837

Source: Belgrand E 1887 *Les travaux souterrains de Paris V: les égouts et les vidanges* Dunod, Paris

nineteenth-century solution to the problem of rapid urbanization. The transformation of Paris gave the bourgeois revolution its most radical architectural expression of any European city. The reconstruction reflected the needs of an urban mercantile class who faced the consequences of modernity not by an escape into romantic anti-urbanism, but through a celebration of the possibilities for the technological mastery of urban space and the search for progressively greater degrees of social and spatial order.³⁵ Yet, as we shall see, these new discourses of order and control both reflected and constituted emerging tensions and inequalities, driven by the processes of capitalist urbanization.

When Haussmann and Belgrand began their work in the early 1850s, the city was still served by a medieval network of sewers clustered around the city centre (Figure 3).³⁶ The preliminary investigations of Haussmann and his chief engineer Eugène Belgrand soon revealed a series of design faults in the existing sewer system. The size of the sewers had been determined by the height of a sewerman, and they were inadequate for handling large quantities of water after heavy rain. The layout, elevation and gradient of the sewers were unable to prevent water from periodically flooding onto the

streets, and much of the growing city was not even integrated into the existing drainage system.³⁷

In 1857, the sewer reconstruction programme began in earnest. The first major project was the construction of the Collecteur Général d'Asnières, a new elliptical structure approximately 14 feet high and 18 feet wide. The purpose of this complex channel, far bigger than the existing Collecteur de la Rue de Rivoli, was to ensure that waste waters would be diverted into the River Seine downstream of the city.³⁸ Both Haussmann and Belgrand believed that a modern sewer system should, as far as possible, be mechanically cleaned, in order to eliminate the need for dangerous and degrading human labour (the sewers had hitherto been cleaned by hand using the most rudimentary of tools). Their conception of spatial rationalization thus extended to the application of new labour practices, as well as to the use of the latest advances in the engineering and empirical sciences. The most significant technological achievement of all, however, which effectively completed the major part of the new sewer system, was the construction of a vast siphon under the Seine in 1868, in order to connect the two sections of the Collecteur de la Bièvre.³⁹ By 1870, the city was

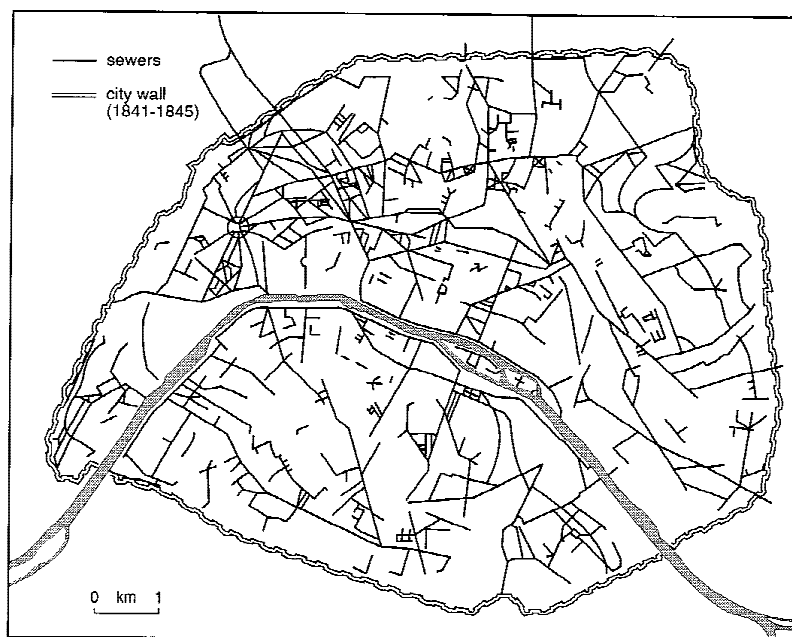


Figure 4 Paris sewers built between 1856 and 1878

Source: Belgrand *Les travaux souterrains de Paris V op cit*

served by a network of 348 miles of sewers – a virtual fourfold increase on twenty years earlier (Figure 4).

But what were these new sewers actually for? When the reconstruction of the sewers began in the 1850s, it was assumed that only limited quantities of human faeces from individual homes would enter the sewer system (only a fifth of private dwellings were connected at this time), and that there would be a continuation in the work of night-soil collectors.⁴⁰ The initial scope of the reconstruction was thus concerned primarily with the drainage of storm waters; however, the steady increase in personal water consumption unsettled this conception of the public works that would be required. Haussmann was reluctant to allow any human faeces to enter the magnificent collecting channels of the new sewer system, and only did so under intense pressure from the city's municipal authorities.⁴¹ The desire to separate 'clean' storm water from 'dirty' human waste was integral to Haussmann's conception of an orderly flow of water through urban space. His objections to human excrement entering the sewer system were not only related to the contamination of the underground city; he feared that the dilution of human

waste in water would reduce its value as a fertilizer, and thereby disrupt the organic economy of the city.⁴² Human faeces, collected as night-soil, had long been used profitably in northern France as a fertilizer for agriculture, and in the manufacture of saltpetre for gunpowder, thereby allowing a cyclical integration of bodily functions into the regional economy.⁴³

Haussmann was not alone in his desire to separate the drainage of storm water from the continuing reliance on cesspits for human waste. In the 1850s, opposition to the connection of sewers to individual homes came from various quarters. A vociferous source of hostility were the cesspool cleaning companies, who feared that they would be ruined by alternative means of treating waste water. The city itself also made money out of night-soil collection and the processing operations at Montfaucon and Boncy, and therefore favoured a continuation in existing arrangements.⁴⁴ The users of night soil in agriculture also drew attention to the declining nitrogen content caused by the greater mixing of faeces with water. Consequently, the lowest-value material was being collected from the richer parts of the city where the use of water closets was gaining popularity. Before the

extensive application of deficit-financing for public works, there was also concern as to how the costs of sewer construction would be spread, since only a third of dwellings were directly supplied with running water.⁴⁵

In the 1860s, an apparent compromise was reached by allowing human faeces to enter parts of the sewer system and diverting this water for agricultural use. The leading city engineer, A A Mille, successfully used sewer water for the irrigation and fertilization of vegetables in the fields of Clichy and Gennevilliers near the city's main sewage outlets. He advocated the use of the same sewers for the handling of storm water and human waste, based on his knowledge of sanitary improvements carried out in England. However, this solution met with official resistance in Paris, where most engineers continued to insist on just two options: either a separate sewer system for human waste or an improvement in night-soil collection.⁴⁶ In nineteenth-century Amsterdam, for example, the Lieurnur sewer system had been adopted, with separate networks for storm water and human waste, but this was to be rejected in Paris on the grounds of cost.⁴⁷ Property owners fiercely resisted higher taxes for sewer construction, as well as the construction of impermeable cesspools to replace the *fosses à fond perdu* that seeped their contents into the subsoil. Landlords continued to eschew any connection to piped water supplies, despite the free installation of rising mains from 1881, because increased water usage would necessitate the reconstruction and more frequent emptying of cesspools if their properties remained separate from the sewer system. Powerful resistance to draining human waste into the Seine also came from the 'fanatics of Seine water', who advocated the continuing use of the river for drinking water, along with Pasteur and other influential microbiologists, who feared the public health effects of contaminating the Seine with cholera and typhoid.⁴⁸ What was distinctive, however, about the immediate post-Haussmann era was the co-existence of a number of competing conceptions of the most appropriate means to regulate the flow of water in the city.

It was not until 1894 that the link between private dwellings and the sewer system was finally made obligatory, as rising water usage (which doubled between 1870 and 1890, despite the recalcitrance of private landlords) and the cholera epidemics of 1884 and 1892 eventually overwhelmed

the traditional reliance on cesspools.⁴⁹ The fact that tenants themselves were, in increasing numbers, seeking out properties that were connected to the city's water and sewer system must also have increased the pressure to complete the modernization of urban infrastructure.⁵⁰ Furthermore, technical and scientific opinion was beginning to shift decisively towards the *tout à l'égout* solution, in recognition that combined sewers for storm water and human waste were increasingly being adopted by other European cities.⁵¹ By the end of the nineteenth century, the dual pressures of disease and growing water usage, along with the advent of inorganic fertilizers and growing public aversion to human waste, eventually overwhelmed the remnants of pre-modern conceptions of urban order and introduced a new set of relationships between water and urban society.⁵²

Water, modernity and the bashful civic body

The eventual cross-connection of Haussmann's storm sewers to accommodate human faeces, the *tout à l'égout* solution to public health, reflects a complex shift in attitudes towards the use of water. During the medieval and early modern period, there was little use of water in Europe for personal hygiene, and hence little need for sewers to drain water away from private dwellings. In the pre-modern period, the use of water for washing remained predominantly a collective endeavour, and was often therapeutic or recreational.⁵³ Evidence suggests that group bathing in Europe began to decline from the fifteenth century onwards in the wake of the Counter-Reformation and changing moral codes towards public nudity. In the eighteenth century, however, we find a rediscovery of bathing that undermined existing conceptions of the relationship between water and the body.⁵⁴ The sensuous flow of water (and even the advocacy of cleanliness in readiness for sexual pleasure) struck at the heart of conflicting concerns with moral purity, hygiene and social order. Washing had long been associated with pagan sensuality in early Christian belief, and, for most of the nineteenth century, the bathroom was restricted to the homes of the rich, tourist hotels and luxury brothels. Consequently, the associations of water with opulence, debauchery and pre-revolutionary court society persisted into the modern period.⁵⁵

A decisive change occurred with what the cultural historian Alain Corbin terms the 'olfactory revolution', whereby the bourgeois sense of smell became newly sensitized to body odour, thus leading to an increasing desire for private space. It was not so much that conditions had suddenly changed, but that there was a new intolerance under the sensory realignment of modernity.⁵⁶ The emergence of new standards of cleanliness brought individuals into contact with their own bodily smells and contributed to the emergence of a 'new narcissism'. By the end of the nineteenth century, there were firmly barred doors to washrooms and bathrooms and an elimination of the 'old promiscuity in defecation and the jumble of excremental odors'.⁵⁷ As the places for washing and defecation became separated, this led to the increasingly complex design of private space and the interior of buildings.

During the later decades of the nineteenth century, more and more towns and cities across Europe became integrated into comprehensive water supply and sewerage systems, in order to accommodate the increasing demand for personal use of water.⁵⁸ With the growing use of private washrooms, the smell of human excrement began to lose the last semblance of its rural associations with fertility: from now on it was to be indicative of disorder, decay and physical repulsion. This is reflected in a survey of Parisian smells published in 1881, which recorded that cesspits, refuse and sewers were the three most unpleasant odours, and that the proliferation of regulations for the construction and operation of cesspits had proved utterly futile in solving this problem.⁵⁹ The new-found bashfulness towards bodily functions in bourgeois French society emphasized the association of sewers with excrement. With the growing involvement of the state, under the guise of public health reform, the management of excrement became an increasingly rationalized activity, resulting in a steady decline in the use of cesspits, the activities of night-soil collectors and communal places for defecation. Henceforth, the 'regimes of the alimentary' were to be confined increasingly to domestic space under a new set of relationships between the body, technology and urban architecture.⁶⁰

One of the consequences of the reconstruction of the sewer system was that all waste water was now discharged into the Seine at just two points along the river, Asnières and Saint-Denis. Unlike

contemporary integrated sewage treatment systems, Haussmann's sewers were only intended for storm water and lacked any means for pollution control. With the increasing quantities of human and industrial wastes entering the sewer system, these two outlets left stretches of the river 'a cauldron of bacteria, infection and disease'.⁶¹ With declining water quality, the irrigation systems at Gennevilliers were abandoned and the pre-modern 'organic economy' was gradually lost to the demands of modern pollution control. With the loss of the organic continuities of pre-modern nature, a 'modern' nature was being constructed through the planting of trees, the building of parks and new transport links, which enabled excursions to the city's hinterland. The Haussmanization of Paris was, above all, a process of redefining nature in metropolitan terms, of inscribing new patterns of social and spatial order within which nature was increasingly to be a focus of leisure and convenience rather than of material necessity. In Seurat's *Bathers at Asnières*, for example, we find a set of figures relaxing by the Seine (Figure 5). This post-impressionist scene has for many observers served as a poignant critique of the emerging isolation and *ennui* of late nineteenth-century urban life. A succession of art historians and critics from Félix Fénéon onwards have seen this type of work as the epitome of a kind of scientific realism which grew out of the prevailing rationalist and positivist ideologies of the time. Meyer Schapiro, for example, conceived of Seurat's vision as a counterpart to the technical and engineering outlooks of the Parisian lower-middle classes. Schapiro even went so far as to suggest that Seurat's pointillist technique represented a combination of rationalist aesthetics with existential social critique.⁶² Ranged against these materialist readings of the work are those critics who have conceived of the *Bathers* as lying closer to idealist and symbolist traditions wherein art is not predicated on the faithful mimesis of social reality, but is a means of accessing a higher order of creative perfection.⁶³ The problem, however, with relegating Seurat to some form of neoplatonic aesthetic universe is that the cultural significance of the work in both reflecting and reinforcing changing attitudes towards nature may be overlooked.

A more fruitful line of argument is to suggest that Seurat successfully captures a new kind of mediation between society and nature in post-Haussmann Paris: we are presented with a

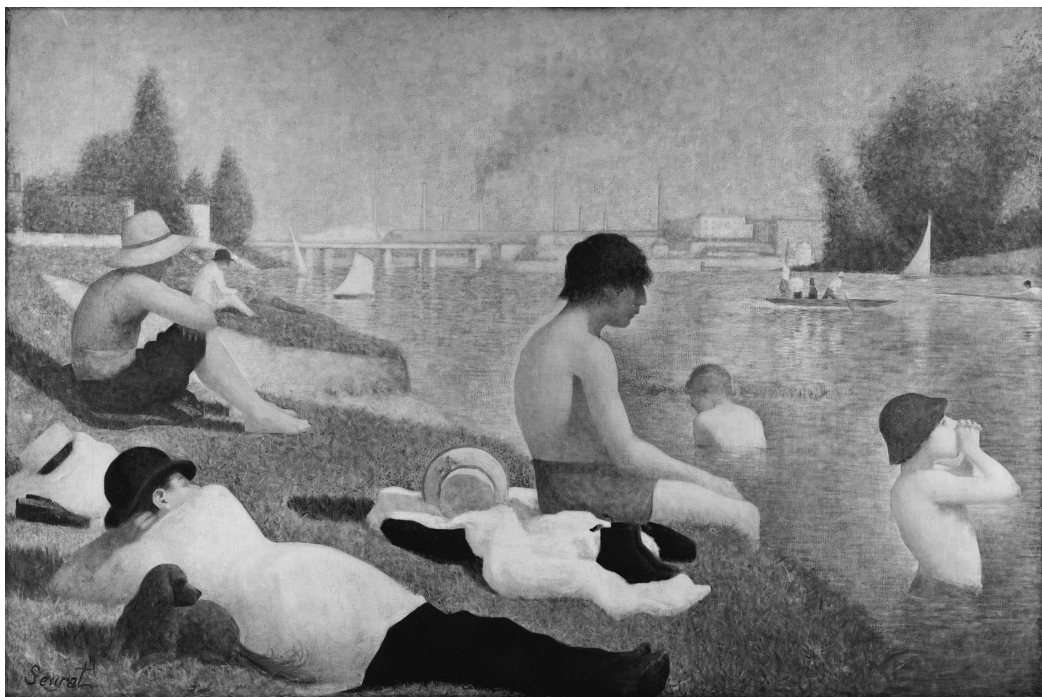


Figure 5 'Bathers at Asnières' Georges-Pierre Seurat (1884)

(Courtesy of the National Gallery, London)

regularized, stylized and commodified imagery based around leisure, spectacle and the semblance of salubrity. In the place of the organic continuities of the past lies a new kind of nature for individualized leisure and consumption. A pictorial genre of the 'urban pastoral' presented the outskirts of Paris as a harmonious interplay between nature and industry, within which real labour was left invisible.⁶⁴ In Seurat's *Bathers*, we find a unique representation of urban nature in transition, where the established pleasures of bathing in the outskirts of Paris were simultaneously being dispelled by both declining water quality and the development of new transport links which provided greater accessibility to more salubrious places further afield from the metropolis. Although the *Bathers* depicts a scene just upstream of the newly constructed sewer outflow, the figures in the water seem curiously detached, as if drawn from a pre-microbiological world in which water retains its elemental and symbolic purity in the face of rapid industrialization. Bathing is used here to denote an ironic continuity with the aesthetic traditions of the past, yet these figures are framed by an industrial

skyline of smoke and steam rather than the sylvan glades used by popular nineteenth-century artists such as Raphaël Collin and Jean-Charles Cazin.⁶⁵ The changing place of water emerges as a central element in the shifting boundary between pre-modern and modern conceptions of nature. Yet the rationalizing impulse of modernity could never completely erase the surviving elements of a mythic urban space within which metaphors of bodily and social disorder could powerfully resurface to haunt the newly regulated urban society. Just as the water in Seurat's *Bathers* swirled with unseen bacteria, the underground city continued to provide a source of anxiety and fascination for metropolitan society.

Sewers and the urban uncanny

In one of earliest surveys of the Paris sewers, in 1824, the public health activist Parent-Duchâtelet (1790–1835) prepared a detailed olfactory topography of underground Paris, based on a series of specific smells such as 'insipid' (*l'odeur fade*) and

'putrid' (*l'odeur putride*).⁶⁶ For Parent-Duchâtelet, sewers afforded the opportunity to combine aesthetic, moral and scientific discourses, and formed an integral element in the meticulous documentation of the realms of urban life beyond the reaches of everyday bourgeois experience. In particular, the hygienist doctrine promulgated by Parent-Duchâtelet and his successors emphasized an explicitly gendered conception of the interrelationship between sexuality and urban disorder:

Prostitutes are as inevitable in an agglomeration of man as sewers, cesspits and garbage dumps; civil authority should conduct itself in the same manner in regard to the one as to the other: its duty is to survey them, to attenuate by every possible means the detriments inherent to them, and for that purpose to hide them, to relegate them to the most obscure corners, in a word to render their presence as inconspicuous as possible.⁶⁷

The taming of nature through the new technologies of modernity carried with it an implicit echo in the social sphere.⁶⁸ In bourgeois French society, women were relegated to a dichotomous olfactory universe of the 'foul' and the 'fragrant', which became manifest in the cultural and aesthetic discourses of urban design above and below ground. The relegation of women to an opposite world of nature and unreason had an increasingly powerful hold over the prevailing political and intellectual outlooks of nineteenth-century Paris, where the dichotomous cultural representation of women reached its apotheosis with the flow of water through urban space. The public face of water in the lakes and fountains of imperial Paris was to be a celebration of the female form for the pleasure of the male citizen. Water-based sculptures and architectural forms allowed a symbolic continuity with classical themes based around water, nudity and human physical perfection. By the 1870s, the Renaissance emphasis on the male nude as ideal human form was increasingly supplanted by the female nude and the imposition of a new body aesthetic.⁶⁹ The ornamental public fountains of Haussmann's Paris exemplified the combination of water with the control of women's sexuality in the most expensive Belle-Epoque neo-Fontainebleau style favoured by Napoleon III.⁷⁰

Yet, if these fountains, lakes and other ornamental features represented the charm of virginal innocence, then the sewers continued to represent the dangerous obverse of female sexuality. The association of women with impurity is not, of course, an

invention of modernity, yet it is the reworking of pre-modern beliefs in the context of capitalist urbanization that is of interest here. In Second Empire Paris, the repression of bodily functions in bourgeois society became increasingly manifested in a fear of women and the poor. Ideological readings of nature, which drew liberally on modern science, contributed towards sharpening gender differences, with a new-found emphasis on the domestic ideal and the promotion of complementary gender roles. In reinforcing innate conceptions of 'gender as nature', we find a convergence between the ideas and writings of Jules Michelet, Auguste Comte, Ernest Legouvé and a panoply of other leading nineteenth-century scientists, writers and intellectuals.⁷¹ Underground urban infrastructure became a kind of repository for untamed nature, within which the innate tensions behind capitalist urbanization became magnified and distorted through the lens of middle-class anxiety.

The sewer has consistently been associated with what we might term the 'urban uncanny': a spatially defined sense of dread in modern urban societies. In order to understand the peculiar complexity of the 'sewer' as a recurring spatial locus of the uncanny, we need to unravel how bodily metaphors have become transposed in urban space. Within Western intellectual traditions, it is Sigmund Freud's essay on 'the uncanny', published in 1919, which has served as a focal point for a myriad of debates concerning the interconnection between the psychological and spatial domains of modern societies.⁷² The uncanny is best conceived as a boundary aesthetic with its spatiality rooted in anxieties of displacement and disorientation. Conventional accounts of the uncanny suggest that, in passing from the world above ground into that below, we are entering a new intensity of zones between the rational and irrational, nature and culture, male and female, the visible and invisible.⁷³ Yet these dichotomous metaphors tend to conceal more than they actually reveal, obscuring the flows and interconnections that constitute material reality behind an illusion of stasis and symmetry.

Recent feminist scholarship has reinterpreted the Freudian reading of the uncanny in order to dispense with more simplistic gender-based conceptions of spatial disorientation and anxiety.⁷⁴ Rather than conceiving of the uncanny as a kind of urban gothicism in the Burkean aesthetic tradition, we are better served by re-interpreting the uncanny

as an outcome of the complex intersection between the human body and the built environment. Within this schema, sewers represent a metaphorical space of defilement and confinement, their poignancy stemming from the interconnection between the private space of the home and the public *mélange* of urban infrastructure. The metaphorical grid surrounding the experience of the uncanny is ultimately a mystification of material reality in its implication that urban origins lie concealed beneath the surface of the city rather than being constituted through the more distant sets of social relations and spatial interconnections that sustain capitalist urbanization. The urban uncanny is a spatial fetishism of absence, a mythological response to the unseen and the unknown, which weaves together popular misconceptions of how cities function with dominant ideological responses to urban disorder.

The new urban infrastructures of nineteenth-century Paris unsettled existing metaphors of urban space: with the breaking of the organic cycle, human excrement took on an intensely abject quality as part of a multiplicity of flows that integrated the body and urban society into an uneasy whole.⁷⁵ The 'fear of touching' and the withdrawal from intimacy or curiosity towards strangers forms part of the atomization of social life under modernity.⁷⁶ In this context, the relationship between organic and social metaphors becomes problematized, since the city can no longer be meaningfully conceived as a holistic or autarchic entity, but emerges as a dynamic intersection of the circulatory processes based around the exigencies of economic exchange. The 'olfactory revolution', emboldened by the new discourses of the medical sciences, set in train an irreversible shift in water usage, the cultural significance of bodily smell and the demand for private space. The urban transformation created a city in which social and economic differences not only were widened, but were much more keenly felt. The separation and reorganization of space set in motion an increasing dichotomy in the olfactory experience of the urban environment between the middle classes and the labouring poor (who were considered indifferent). The old vertical separation of the classes in the apartment houses of pre-modern Paris was gradually to be supplanted by a new emphasis on horizontal segregation. Under the construction boom of the Second Empire, there was a progressive concentration of the middle classes in the

central and western parts of the city. The quest for profit strengthened the social distribution of odours, as the cleansing of the city involved a simultaneous relocation of the working classes and industry to the urban periphery.⁷⁷ Haussmann's leading critics, such as Louis Lazare, repeatedly drew attention to the mass displacement of people from central Paris, and the emergence of the new slums and *faubourgs* at the city limits. The obverse to the rational city was not to be found beneath the streets, but in what T J Clark has termed the 'melancholic *banlieue*', a muddle of suburban sprawl, small holdings and displaced communities on the outskirts of Paris.⁷⁸

Conclusion

The interrelationships between technology, modernity and capitalist urbanization are well documented. The provision of light, mobility, energy and water form part of an urban palimpsest in the progressive rationalization of urban space.⁷⁹ From the early nineteenth century onwards, advances in medicine, chemistry and demography began to reveal the high death rates of towns. As a consequence, the progress of science and the administrative needs of the state developed in a symbiotic fashion.⁸⁰ Yet, the development of new urban infrastructures also stemmed from the demand for greater privacy under the intensified self-awareness of modernity. The increasing aversion to communal washing facilities and the smell of excrement led to the growing use of water for washing and cleaning, which then had to be drained away. This combination of different factors behind the reconstruction of nineteenth-century cities led to a contradictory response on the part of urban planners. Though much of the literature on nineteenth-century Paris portrays Haussmann as a figure who faced rather than avoided the consequences of modernity, the actual sequence of events presents a far more complex picture. The creation of a modern metropolis introduced new sources of disorder, which conflicted with existing conceptions of urban form and the pre-modern circulation of water in cities. We saw, for example, how Haussmann resisted the use of his new sewers for human faeces. His advocacy of a 'partial modernity' was rooted in a desire for a holistic and organic union of the city in all its parts, predicated on a conception of public health that owed more to

the neo-Hippocratic doctrines of the past than to the latest advances in scientific thought.⁸¹ The eventual integration of private dwellings into the city's sewer network in the post-Haussmann era was driven to a greater extent by changing attitudes towards the use of water than to any putative triumph of microbiological rationality over competing conceptions of public health.

The contradictory rationale behind the reconstruction of the Paris sewer system challenges simplistic tautologies, which simply equate modernity with the process of Haussmannization.⁸² Haussmann was unable to reconcile his conception of urban order with the disengagement of urban design from explicitly organic metaphors. The tensions within Haussmann's conception of water flow in urban space stemmed from an 'uneven modernity', which extended across the physical, engineering and medical sciences. Eighteenth-century conceptions of the elemental purity of water persisted despite the gathering pace of technological and scientific advances.⁸³ In the context of water and urban design, we need to differentiate essentially pre-modern holistic and geometric visions from the powerful exigencies of capitalist urbanization operating at successively wider spatial scales. Under capitalist space and time, the corporeal unity of the pre-modern city was to be irrevocably altered, exposing an innate tension between function and perfection in the design of Second Empire Paris. The reconstruction of Paris under Haussmann was founded on a peculiar political medley of state intervention, liberal deference for powerful economic elites and a mix of aristocratic and imperial visions for the French metropolis. In his memoirs, Haussmann frequently compared his reconstruction of the Paris water and sewer system to that of imperial Rome. In Pliny's description of Rome, for example, the city's sewers are singled out as 'the most noteworthy achievement of all', and parts of the original Roman aqueducts were actually incorporated into the city of Paris's new water supply system from the Dhuys, the Vanne and the Marne in the eastern Paris basin.⁸⁴ Yet the imperial pretensions behind the rebuilding of Paris were shattered by a succession of foreign policy failures in Crimea, Italy and Mexico, culminating in the defeat of the Second Empire in the Franco-Prussian War of 1870. Whilst these episodes have been condemned by posterity, the legacy of urban and infrastructural reconstruction has met with admiration by a succession of

twentieth-century historians such as Richard de Kaufmann, Wladimir d'Ormesson, Raoul Busquet and André Monzet.⁸⁵

Despite the physical transformation of sewers over the modern period, they have never entirely lost their earlier associations with danger, disorder and threatening infestations. Through their various gender-laden, seditious and mutagenic permutations, sewers have come to symbolize the particular fears of each successive phase of bourgeois society. Sewers have consistently been portrayed as a focal point for political threats to social and political stability, both real and imagined: during the 1870 siege of Paris in the Franco-Prussian war, there was apprehension that the Germans might secretly enter the city through the sewers, and the city authorities actually sealed the Collecteur Général d'Asnières in order to assuage public fears.⁸⁶ The sewer has consistently been portrayed as a symbol of the unclean city, a metonym for what Godwin termed the 'entire excrementation of the Metropolis'.⁸⁷ The 'cesspool' city of the nineteenth century was a place where metaphors of disease and moral degeneration mingled with the threat of women and the labouring classes to middle-class society. Even the most progressive and perceptive of nineteenth-century commentators on urban life – such as Engels, Dickens and Baudelaire – failed to look beyond their dichotomous urban worlds of 'dirt and cleanliness'.⁸⁸ Yet, in order to understand the enduring association of the subterranean city with the 'urban uncanny', we need to transcend these dualistic metaphors and develop a richer appreciation of how human bodies and urban form interact.

By tracing the flow of water through the 'urban alimentary system', we can discern a series of tensions and contradictions that underlie the development of the modern city. Water provides a powerful link between the body and the built environment, within which competing conceptions of public health and spatial order have become entwined. The very fluidity of water as both a biophysical and a symbolic realm serves to disrupt and challenge simplistic understandings of how complex urban societies function and the degree to which social and spatial order can ever be achieved under the contradictory dynamics of capitalist urbanization. The Haussmann era, as we have seen, was both contradictory in its inception and also highly uneven in its practical impact. It was not until the 1930s, after all, that the whole of Paris

was finally integrated into the city's water and sewer system as a 'public service', as distinct from the more differentiated and private approaches of the past.⁸⁹

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Notes

- 1 'A deformed tangle of filth and entrails beyond the imagination of Piranesi' (author's translation) in **Nadar F** 1861 (reprinted 1982) *Le Paris souterrain de Félix Nadar 1861: des os et des eaux* Caisse Nationale des Monuments Historiques et des Sites, Paris 41.
- 2 'The magnificent sewers of Paris have always been a source of public fascination and have been honoured with illustrious visits. Not a single foreign monarch or distinguished person has left Paris without visiting the sewers.' (**Belgrand E** 1887 *Les travaux souterrains de Paris V: les égouts et les vidanges* Dunod, Paris 174, author's translation)
- 3 **Hiorns F R** 1956 *Town-building in history: an outline review of conditions, influences, ideas, and methods affecting 'planned' towns through five thousand years* George G Harrap, London 247.
- 4 **Bacon E N** 1967 *Design of cities* Thames and Hudson, London 179. See also **Berman M** 1982 *All that is solid melts into air: the experience of modernity* Verso, London 131–72; **Clark T J** 1985 *The painting of modern life: Paris in the art of Manet and his followers* Thames and Hudson, London; **Gaillard J** 1977 *Paris la ville, 1852–1870* Champion, Paris; **Harvey D** 1985 *Consciousness and the urban experience: studies in the history and theory of capitalist urbanization 1* Blackwell, Oxford; **Morizet A** 1932 *Du vieux Paris au Paris moderne, Haussmann et ses prédécesseurs* Hachette, Paris; **Pinol J-L** ed 1996 *Atlas historiques de villes de France* Centre de Cultura Contemporània de Barcelona, Barcelona; **Olsen D J** 1986 *The city as a work of art: London, Paris, Vienna* Yale University Press, New Haven CT 35–57; **Roncayolo M and Bergeron L** 1989 *D'Hausmann à nos jours* in **Bergeron L** ed *Paris: genèse d'un paysage* Picard, Paris 217–98; **Rossi A** 1982 *The architecture of the city* (original 1966; translated by D Ghirardo and J Ockman) MIT Press, Cambridge MA; **Saalmann H** 1971 *Haussmann: Paris transformed* George Braziller, New York; **Sutcliffe A** 1970 *The autumn of central Paris* Arnold, London; 1981 *Towards the planned city: Germany, Britain, the United States and France 1780–1914* Blackwell, Oxford; 1993 *Paris: an architectural history* Yale University Press, New Haven CT.
- 5 An exaggerated emphasis on the significance of the Haussmann era is to be found in **Benevolo L** 1993 *The European city* (translated by C Ipsen) Blackwell, Oxford; **Chapman J M and Chapman B** 1957 *The life and times of Baron Haussmann: Paris in the second empire* Weidenfeld and Nicholson, London; **Jordan D P** 1995 *Transforming Paris: the life and labors of Baron Haussmann* Free Press, New York. Benevolo suggests that in Second Empire Paris, there was a decisive shift from private to public interests, yet, as this paper shows in the case of sewers and urban sanitation, public interests only began to prevail in the 1890s.
- 6 The most comprehensive piece of recent scholarship on the Paris sewers is provided by the historian Donald Reid, but his study does not explore the interrelationships between modernity and urban space or the cultural ramifications of new urban infrastructures in any detail. Reid's primary interest is in labour history over a very long time frame, from the pre-modern era until the late twentieth century. See **Reid D** 1991 *Paris sewers and sewermen: realities and representations* Harvard University Press, Cambridge MA. Barrie Ratcliffe, in a paper devoted to the city's nineteenth-century sanitation arrangements, explores the sewage system pre-Haussmann, and emphasizes how urban historians have tended to overlook the significance of this earlier era. See **Ratcliffe B M** 1990 *Cities and environmental decline: elites and the sewage problem in Paris from the mid 18th to the mid 19th century* *Planning Perspectives* 5 189–222. In contrast, this paper suggests that it is the last decade of the nineteenth century that presents a crucial transformation in the continuity between the Haussmann period and earlier times.
- 7 In cinema alone, we can draw on many examples, such as Carol Reed's *The third man* (1948), Andrzej Wajda's *Kanal* (1956) and Stephen King's *It* (1987). As for literature, examples include Emile Zola's *Germinal* (1885), Gaston Leroux's *The phantom of the opera* (1911) and Victor Hugo's *Les misérables* (1862). More recently, the theme of the urban labyrinth has been developed in Thomas Pynchon's *V: a novel* (1963) and Harlan Ellison's *Strange wine* (1978); in music, sewers have featured in 1970s new wave, with The Stranglers' *Down in the sewer* (1977), and in contemporary rap, with DAS EFX's *Straight from the sewer* (1995).

- 8 **Hugo V** 1982 *Les misérables* (original 1862; translated by N Denny) Penguin, Harmondsworth 1075. Hugo based his vivid description of the pre-Haussmann Paris sewers largely on the accounts given by the early nineteenth-century public health activist Parent-Duchâtelet. For an interesting analysis of Hugo's conception of the subterranean city, see **Chevalier L** 1973 *Laboring classes and dangerous classes in Paris during the first half of the nineteenth century* (original 1958; translated by F Jellinek) Princeton University Press, Princeton NJ. See also **Lesser W** 1987 *The life below the ground: a study of the subterranean in literature* Faber and Faber, Boston; **Williams R H** 1990 *Notes on the underground: an essay on technology, society and the imagination* MIT Press, Cambridge MA.
- 9 **Vidler A** 1992 *The architectural uncanny: essays in the modern unhomely* MIT Press, Cambridge MA 192. See also **Florman S C** 1976 *The existential pleasures of engineering* St Martin's Press, New York.
- 10 **Williams** *Notes on the underground* op cit 21.
- 11 'Les galeries souterraines, organes de la grande cité, fonctionneraient comme ceux du corps humain, sans se montrer au jour; l'eau pure et fraîche, la lumière et la chaleur y circuleraient comme les fluides divers dont le mouvement et l'entretien servent à la vie. Les sécrétions s'y exécuteraient mystérieusement, et maintiendraient la santé publique sans troubler la bonne ordonnance de la ville et sans gêner sa beauté extérieure.' (**Haussmann B** 1854 *Mémoire sur les eaux de Paris, présenté à la commission municipale par m le préfet de la Seine* Vinchon, Paris 53)
- 12 A variety of interdisciplinary approaches to the understanding of water, modernity and architectural form are to be found in **Lahiji N and Friedman D S** eds 1997 *Plumbing: sounding modern architecture* Princeton Architectural Press, New York. See also **Swyngedouw E** 1996 The city as a hybrid: on nature, society and cyborg urbanization *Capitalism, Nature, Socialism* 7 65–80.
- 13 **Hambourg M** 1995 A portrait of Nadar in **Hambourg M Heilbrun F and Néagu P** eds 1995 *Nadar* Museum of Modern Art, New York 2–35. Nadar's family had strong republican and internationalist sentiments: his father had taken part in the Lyonnais uprising during the French revolution and had also published Félicité de Lamennais's radical tract entitled *Essai sur l'indifférence en matière de religion* in 1817. On the history of photography, see **Gernsheim A and Gernsheim H** 1965 *L J M Daguerre: the history of the diorama and the daguerreotype* Secker and Warburg, London; 1969 *The history of photography from the camera obscura to the beginning of the modern era* McGraw-Hill, New York; **Newhall B** 1982 *The history of photography* Museum of Modern Art, New York; **Scharf A** 1968 *Art and photography* Allen Lane, London; **Szarkowski J** 1989 *Photography until now* Museum of Modern Art, New York.
- 14 **Harvey** 1985 *Consciousness and the urban experience* op cit 65.
- 15 See **Eugny A** 1945 *Au temps de Baudelaire, Guys und Nadar* Editions du Chêne, Paris; **Gosling N** 1976 *Nadar* Secker and Warburg, London; **Prinet J and Dilasser A** 1966 *Nadar* Colin, Paris; **Rice S** 1997 *Parisian views* MIT Press, Cambridge MA.
- 16 **Aubenas S** 1995 Beyond the portrait, beyond the artist in **Hambourg et al** *Nadar* op cit 95–107.
- 17 **Hambourg A** portrait of Nadar op cit; **Heilbrun F** 1995 Nadar and the art of portrait photography in **Hambourg et al** *Nadar* op cit 35–59; **Krauss R** 1978 Tracing Nadar *October* 5 29–47; **Néagu P** 1995 Nadar and the artistic life of his time in **Hambourg et al** *Nadar* op cit 59–77; **Rouille A** 1995 When I was a photographer: the anatomy of a myth in **Hambourg et al** *Nadar* op cit 107–14.
- 18 The debate surrounding modernity and aesthetic realism is a pivotal theme in relation to critical receptions of the emergence of impressionist and post-impressionist art. See **Sutcliffe A** 1995 The impressionists and Haussmann's Paris *French Cultural Studies* 6 2 197–219.
- 19 **Nadar F** 1900 (reprinted 1994) *Quand j'étais photographe* Seuil, Paris; **Nadar** *Le Paris souterrain de Félix Nadar 1861* op cit. See also **Dollfus C** 1962 *Balloons* (original 1960; translated by C Mason) Prentice-Hall, London; **Rey P** 1970 Du ballon de Nadar à Apollo XIII: la détection à distance des ressources naturelles *Mémoires de l'Académie des Sciences, Inscriptions et Belles-Lettres de Toulouse* 132 97–103.
- 20 **Hambourg A** portrait of Nadar op cit 28.
- 21 **Hugo** *Les misérables* op cit 1072. The word 'cloaca' is described in the Oxford English Dictionary as meaning 'Sewer; excrementary cavity in birds, reptiles, etc; gathering place of moral evil'. The word is derived from the Latin *Cloacina*, the Roman goddess of the sewer. See **Reid** *Paris sewers and sewer men* op cit 15.
- 22 See **Schivelbusch W** 1988 *Disenchanted night: the industrialization of light in the nineteenth century* (original 1983; translated by A Davies) Berg Publishers, Oxford.
- 23 **Pinkney D** 1958 *Napoleon III and the rebuilding of Paris* Princeton University Press, Princeton NJ.
- 24 See **Reid** *Paris sewers and sewer men* op cit. Demand easily outstripped available places on allocated visiting days and the sewers were listed as a major attraction in popular tourist guides of the late nineteenth century. See, for example, **Baedeker K** 1876 *Paris and its environs* Karl Baedeker, Leipzig.
- 25 **Pinkney** *Napoleon III and the rebuilding of Paris* op cit 143.
- 26 **Williams R** 1973 *The country and the city* Oxford University Press, Oxford.
- 27 Quoted in **Corbin A** 1986 *The foul and the fragrant: odor and the French social imagination* (original 1982; translated by M L Kochan R Porter and C Prendergast)

- Harvard University Press, Cambridge MA 115. Paris had been known as the 'city of mud' (*ville de boue*) since Roman times. See **Reid** *Paris sewers and sewer-men* op cit 10–11.
- 28 On the consequences of rapid urban growth, see also **Chevalier** *Laboring classes and dangerous classes in Paris* op cit; **Delaporte F** 1986 *Disease and civilization: the cholera in Paris, 1832* MIT Press, Cambridge MA; **Harvey** *Consciousness and the urban experience* op cit 63; **Kearns G** 1991 *Biology, class and the urban penalty in* **Kearns G and Withers W J** eds *Urbanising Britain: essays on class and community in the nineteenth century* Cambridge University Press, Cambridge 12–30; **Bourdelaïs P** 1987 *Histoire du choléra en France 1832–1854* Payot, Paris; **Kudlick C J** 1996 *Cholera in post-revolutionary Paris: a cultural history* University of California Press, Berkeley.
- 29 **Chapman and Chapman** *The life and times of Baron Haussmann* op cit; **Jordan** *Transforming Paris* op cit; **Malet H** 1973 *Le Baron Haussmann et la rénovation de Paris* Editions Municipales, Paris; **Peets E** 1926 *Famous town planners: Baron Haussmann* *Town Planning Review* 12 181–90.
- 30 **Pinkney** *Napoleon III and the rebuilding of Paris* op cit.
- 31 Saint-Simon (1760–1825) played a significant role in the development of new political and economic ideas, which reflected the growing influence of industrialists and scientists in nineteenth-century France. Like Comte, he was an early advocate of technologically based positivist solutions to political problems, and proved highly influential within the French engineering profession. See **Harvey** *Consciousness and the urban experience* op cit.
- 32 **Pinkney** *Napoleon III and the rebuilding of Paris* op cit.
- 33 **Clark** *The painting of modern life* op cit 37.
- 34 **Harvey** *Consciousness and the urban experience* op cit 87.
- 35 **Saalmann** *Haussmann: Paris transformed* op cit.
- 36 The first covered sewer in Paris was the *égout de ceinture* (the 'beltway sewer'), built by the *prévôt* (city father) Hughes Aubriot in 1370. By 1636, a report revealed that the city had built a network of only 24 sewers, yet most of these were either seriously dilapidated or choked with rotting refuse. No more than a quarter of these sewers were covered and the inability of city authorities to improve the sanitary conditions of the city became symbolic of the ineptitude and iniquity of pre-revolutionary France. By 1826, the major Amelot, La Roquette and Chemin Vert sewers had become completely blocked with refuse, and, with the obstruction of the sewers, the city faced a growing crisis of undrained stagnant water and overflowing refuse dumps. See **Beaumont-Maillet L** 1991 *L'eau à Paris* Hazan, Paris; **Cebon de Lisle P** 1991 *L'eau à Paris au dix-neuvième siècle* Unpublished PhD dissertation, Université de Lille III; **Chevallier A** 1851 *Notice historique sur la police et la distribution des eaux dans Paris depuis 360 jusqu'à l'époque* actuelle, pour servir à l'histoire de la salubrité et de l'hygiène publique des grandes villes *Annales d'Hygiène Publique et de Médecine Légale* 45 5–71; **Diffre P** 1967 *Historique de l'alimentation en eau de Paris* *Bulletin de Bureau de Recherches Géologiques et Minières* 4 3–22; **Dupuit J** 1865 *Traité théorique et pratique de la conduite et de la distribution des eaux* 2nd edition Dunod, Paris; **Emmery M** 1837 *Statistique des égouts de la ville de Paris* Chez Carillan-Goeury, Paris; **Haussmann** *Mémoire sur les eaux de Paris* op cit; **Haussmann G-E** 1854 (reprinted 1861) *De l'égout des eaux* in *Documents relatifs aux eaux de Paris* Paul Dupont, Paris 54–83; **Reid** *Paris sewers and sewer-men* op cit 12–15; **Roche D** 1984 *Le temps de l'eau rare, du moyen âge à l'époque moderne* *Annales: Economies, Sociétés, Civilisations* 39 383–99; **Vautel C** 1904 *Le Seine des eaux à Paris* *Monde Moderne* XX 437–44.
- 37 **Belgrand E** 1854 *Recherches statistiques sur les sources du bassin de la Seine qu'il est possible de conduire à Paris* Vinchon, Paris; **Belgrand** *Les travaux souterrains de Paris V* op cit; **Chevalier** *Laboring classes and dangerous classes in Paris* op cit; **Figuier L** 1862 *Les eaux de Paris* Michel Lévy Frères, Paris; **Haussmann B** 1858 *Second mémoire sur les eaux de Paris présenté par le préfet de la Seine au conseil municipal* Typographie de Charles de Mourgues Frères, Paris.
- 38 **Haussmann** *Second mémoire sur les eaux* op cit. See also **Pinkney** *Napoleon III and the rebuilding of Paris* op cit.
- 39 **Belgrand E** 1875 *Historique du service des eaux, depuis l'année 1854 jusqu'à l'année 1874* Dunod, Paris; **Belgrand** *Les travaux souterrains de Paris V* op cit. Belgrand stressed the importance of better tools and ventilation for sewer workers as part of his modernization programme; **Dumont A** 1862 *Les eaux de Lyon et de Paris* Dunod, Paris; **L'Olivier V Maxwell Lyte F and Stoffel L M** 1873 *Utilisation des eaux des égouts de la ville de Paris et assainissement du cours de la Seine* Imprimerie Polyglotte de L Hugonis, Paris. See also **Caron F** 1990 *Paris et ses réseaux: naissance d'un mode de vie urbain XIX–XXe siècles* Bibliothèque historique de la ville de Paris, Paris; **Pinkney** *Napoleon III and the rebuilding of Paris* op cit 35.
- 40 The term 'night-soil' refers to the contents of various types of cesspools and cesspits and the fact that the unpleasant (and often dangerous) activity of emptying these structures was usually carried out at night. Some of the earliest public health ordinances in France were directed at the problem of human waste: in 1533, for example, a royal decree ordered that every new property must have a cesspool constructed, yet there were no attempts to impose design specifications on these underground structures until the early nineteenth century. See **Deligny M** 1883 *Les projets de loi et de règlement relatifs à l'envoi direct des vidanges à l'égout* Chaix, Paris.
- 41 **Haussmann** *Mémoire sur les eaux de Paris* op cit. The only vestige of a combined sewer system that

- Hausmann permitted was the construction of public urinals (*pissoirs*) along the new boulevards. See also **Pinkney Napoleon III and the rebuilding of Paris** *op cit* 136.
- 42 In 1854, Hausmann wrote disparagingly of the English emphasis on the use of combined sewers for storm water and human excrement:
Même, ainsi corrigé, ce système aurait encore pour résultat inévitable l'infection des galeries d'égout, dont la pente ne peut être que très-faible, d'après le relief du sol de Paris, et qu'aucune chasse d'eau, si forte qu'elle soit, ne lave et n'assainit jamais complètement. (**Hausmann** *Mémoire sur les eaux de Paris* *op cit* 48)
- See also **Dumont A and Dumont G** 1874 *Les eaux de Nîmes, de Paris et de Londres* Dunod, Paris; **Hederstedt H-B** 1865 An account of the drainage of Paris *Minutes of the Proceedings of the Institution of Civil Engineers* 24 257–79; **Pinkney Napoleon III and the rebuilding of Paris** *op cit* 144.
- 43 **Chevallier A** 1860 *Essai sur la possibilité de recueillir les matières fécales, les eaux vannes, les urines de Paris, avec utilité pour la salubrité, et avantage pour la ville et pour l'agriculture* Baillière, Paris; **Paulet M** 1858 *Les vidanges, engrais de Paris* Smith, Paris; **Préfet de la Seine** 1885 *Les vidanges de Paris et l'agriculture* Adolphe Reiff, Paris. See also **Guillermé A E** 1983 (reprinted 1988) *The age of water: the urban environment of the north of France AD 300–1800* Texas A&M University Press, College Station; **Teich M** 1982 Circulation, transformation, conservation of matter and the balancing of the biological world in the eighteenth century *Ambix* 29 17–28.
- 44 **Ducuing F** 1875 *Des eaux d'égout et des vidanges: leur utilisation par irrigation dans leur parcours jusqu'à la mer* Société des Etudes, Paris. See also **Ratcliffe** Cities and environmental decline *op cit*.
- 45 At the close of the Hausmann era, there were still wide disparities in the number of homes connected to the new water distribution system: some 82 per cent of homes in the affluent inner-city *arrondissements* and only 48 per cent in the predominantly working-class outer *arrondissements*. No legal sanctions existed to force existing property-owners to link up to the new system, and new buildings were only required to drain storm water. See **Chatzis K and Coutard O** 1998 Eau et gaz à tous les étages: compared patterns of network development in Paris Paper presented at the 'Urban Futures – Technological Futures' Conference, Durham, 23–25 April.
- 46 In the post-Hausmann era, the advocacy of sewer water for irrigation emerged as a temporary solution to the desire for organic continuity in the circulation of urban water. Examples include **Aubrey-Vitet M** 1880 *L'épuration et l'utilisation des eaux d'égouts* Quantin, Paris; **Belgrand E** 1871 *Transformation de la vidange et suppression de la voirie de Bondy: achèvement des égouts et emploi de leurs eaux dans l'agriculture* Mourgues, Paris; **Châtel V** 1876 *Assainissement de la Seine: épuration des eaux d'égouts avant leur jet dans le fleuve* Trouttet, Asnières; **Durand-Claye M A** 1882 *Réponse à l'article dans la revue des deux-mondes, par Aubrey-Vitet sur la question des égouts de Paris* Choix, Paris; **Hausmann G-E** 1893 *Mémoires du Baron Hausmann: volume 3* 2nd edition Victor-Havard, Paris 319; **Joly C** 1877 *La question des eaux d'égouts en France et en Angleterre* Michels, Paris; 1885 *Les eaux d'égout a Paris* Chaix, Paris; **la Berge A F** 1988 Edwin Chadwick and the French connection *Bulletin of the History of Medicine* 62 23–42; **Mémoire de l'inspecteur general des ponts et chaussées** 1875 *Transformation de la vidange et suppression de la voirie de Bondy: achèvement des égouts et emploi de leurs eaux dans l'agriculture* Mourgues, Paris; **Miotat E** 1881 *Suppression complète de la vidange: assainissement des égouts et des habitations* Ducher, Paris. Joly's writings are particularly interesting for their explicit recognition that the modernization of the Paris sewers remained incomplete:
Il est triste de penser, qu'en 1877, on en est encore à hésiter pour envoyer aux égouts la totalité des vidanges solides et liquides, et que les maisons les plus favorisées n'ont encore que le système diviseur proposé par Gourlier en 1788. Sur 300 000 mètres cubes d'eaux vannes qu'on envoie quotidiennement à la Seine, que peuvent faire 1000 mètres cubes de matières solides à l'état frais? (Joly 1877, 2)
- 47 **Durand-Claye M A** 1880 *Le système de Liernur* G Masson, Paris. See also **Ratcliffe** Cities and environmental decline *op cit*. Some commentators emphasized ever more elaborate technical modifications to the design and operation of cesspits, including the implementation of ideas developed by Gourlier, Giraud and others in the late eighteenth century for the separation of urine and faeces within the home. See **Berlier J-B** 1883 *Projet de vidange pneumatique pour la ville de Paris* Grande Imprimerie, Paris; **Liger F** 1875 *Fosses d'aisances: latrines, urinoirs et vidanges* Baudry, Paris. For Suilliot, the problem of what to do with human waste was 'la question éternelle des vidanges', leaving only two real options: *assainissement* (disposal) or *utilisation* (use) (**Suilliot H** 1880 *La question des vidanges* Vauthrin, Paris 3). Interestingly, Hausmann had also reflected on the technical possibilities for a dual sewer system in his submission to the city's municipal council in 1854 as part of the 'canalisation complète de Paris'; see **Hausmann** *Mémoire sur les eaux de Paris* *op cit* 49–51.
- 48 **Jordan** *Paris transformed* *op cit* 271. It would be difficult to argue that existing sanitation arrangements were clearly backward in public health terms, since Parisian mortality rates compared favourably with other European cities at the turn of the century. See **Kearns G** 1989 Zivolis or Hygaeia: urban public health and the epidemiological transition in **Lawton**

- Red** *The rise and fall of great cities: aspects of urbanization in the western world* Belhaven, London 96–124.
- 49 As early as 1883, the city council urged that the connection and subscription to water and sewer services should be compulsory, in order to extend adequate sanitation to poorer parts of city, but this initial attempt to ensure integration into the city's new water and sewer system was to be subjected to a successful legal challenge by private property interests. See **Chatzis and Coutard** *Eau et gaz à tous les étages op cit*.
- 50 See **Chatzis and Coutard** *Eau et gaz à tous les étages op cit*.
- 51 **Bourneville D** 1892 *Le tout-à-l'égout et l'assainissement de la Seine* Bureaux du Progrès Médical, Paris. Bourneville scorned opposition to the *tout-à-l'égout* solution, pointing out that human faeces had already been entering the sewer system throughout the nineteenth century at La Place Maubert, Rue Saint-Jacques and a number of other locations across the city.
- 52 **Amondruz V** 1883 *Assainissement de Paris: le tout à l'égout rationnel obtenu par la vidange hydraulique* Ducher, Paris; **Bert E** no date *Loi du février 1888 concernant la répression des fraudes dans la commerce des engrais* Chevalier-Maresq, Paris; **Bourneville** *Le tout-à-l'égout et l'assainissement de la Seine op cit*; **Gauthier L** 1888 *Le tout à l'égout, considérations sur les différents systèmes de vidange à Paris* Chamerot, Paris; **Gérards E** 1908 *Paris souterrain* Garnier Frères, Paris; **Poulet-Allamagny J-J** 1982 Note historique in **Nadar** *Le Paris souterrain de Félix Nadar 1861 op cit* 61–2; **Ville G** no date *État de l'opinion du monde agricole en 1890 sur la doctrine des engrais chimiques* Librairie Agricole, Paris.
- 53 **Corbin** *The foul and the fragrant op cit* 72–3; **Vigarello G** 1988 *Concepts of cleanliness: changing attitudes in France since the middle ages* (original 1985; translated by J Birrell) Cambridge University Press, Cambridge.
- 54 **Braham W W** 1997 Siegfried Giedion and the fascination of the tub in **Lahiji and Friedman** *Plumbing op cit* 200–224; **Giedion S** 1948 *Mechanization takes command: a contribution to anonymous history* W W Norton and Co, New York; **Illich I** 1985 *H₂O and the waters of forgetfulness: reflections on the historicity of 'stuff'* Marion Boyars, London. Georges Vigarello details the decline of group bathing in sixteenth-century France and stresses the role played by seigneurial courts and other edicts against public nudity. See 'The disappearance of certain practices' and 'The old pleasures of water' in **Vigarello** *Concepts of cleanliness op cit* 12–37.
- 55 **Corbin** *The foul and the fragrant op cit* 175. In the seventeenth century, bathing had been considered doubly dangerous: the rendering of skin moist and soft was considered 'feminine', whilst simultaneously exposing the body to the threat of unhealthy air and disease. Even Francis Bacon, the pioneer of the empirical sciences, cautioned against allowing 'the liquor's watery part' to penetrate the body. See **Classen C Howes D and Synnott A** 1994 *Aroma: the cultural history of smell* Routledge, London 70.
- 56 The late eighteenth century and early decades of the nineteenth century saw increasing attempts to regulate the use of cesspits more effectively. See, for example, **Dubois M Huzard M and Héricart de Thury M** 1819 *Rapport sur les fosses mobiles inodores* Bureau de l'Entreprise Générale, Paris; **Giraud P** 1786 *Fosses d'aisances et leurs inconvénients* Cailleau, Paris; **Goulet M** 1787 *Inconvénients des fosses d'aisance, possibilité de les supprimer* Auteur, Paris; **Labarraque M Chevallier A and Parent-Duchâtelet A J B** 1840 *Rapport sur les améliorations à introduire dans les fosses d'aisances, leur mode de vidange, et les voiries de la ville de Paris* Renouard, Paris (reprinted in *Annales d'Hygiène Publique* 14 2 1–76); **Laborie M** 1778 *Observations sur les fosses d'aisances et moyens de prévenir les inconvénients de leur vidange* Collège de Pharmacie, Paris; **Lucquel J P** 1840 *De l'assainissement de la vidange et de la suppression des voiries de la ville de Paris* Lacquin, Paris; **Municipalité de Paris** 1792 *Arrêté concernant la salubrité et la vidange des fosses d'aisance, puits et puisards* Lottin, Paris; **Préfecture de police, conseil de salubrité** 1835 *Rapport sur les améliorations à introduire dans les voiries, les modes à vidange et les fosses d'aisances de la ville de Paris* Lottin, Paris; **Sucquet J P and Krafft L** 1840 *L'assainissement de la vidange et de la suppression des voiries de la ville de Paris* Felix Locquin, Paris. Sucquet and Krafft (1840, 6) provide a vivid depiction of the stench and inconvenience of night-soil collection in the early decades of the nineteenth century:
Comme par le passé, chaque maison deviendra tour à tour un foyer d'émanations infectes, et la ville sera sillonnée tous les soirs par ces charettes qu'on devine à leur odeur et qu'on ne peut éviter à une certaine heure dans Paris.
- 57 **Corbin** *The foul and the fragrant op cit*. Norbert Elias develops a similar theme in his exploration of the changing 'frontier of embarrassment', in **Elias N** 1978 *The civilizing process. Volume 1: the history of manners* (original 1939; translated by E Jephcott) Blackwell, Oxford 203, 130. See also **Corbin A** 1995 *Time, desire and horror: towards a history of the senses* (original 1991; translated by J Birrell) Polity Press, Cambridge.
- 58 **Reid** *Paris sewers and sewer men op cit* 27; **Corbin** *The foul and the fragrant op cit* 172–3; **Goubert J-P** 1989 *The conquest of water: the advent of health in the industrial age* (original 1986; translated by A Wilson) Polity Press, Cambridge; **Magraw R** 1993 *Producing, retailing, consuming: France 1830–70* in **Rigby B** ed 1993 *French literature, thought and culture in the nineteenth century: a material world* Macmillan, London 59–85. For the late nineteenth-century architect and essayist Adolf Loos, for example, the increasing use of water and the technological sophistication of plumbing was a vital indicator of cultural advancement. Innovative

- changes in the design of housing were particularly advanced in England, where pressurized water faucets in kitchens and water closets were combined with the disposal of sewage through drains; but their adoption in France proved much slower. See **Loos A** 1997 *Plumbers* (original 1898; translated by H F Mallgrave) in **Lahiji and Friedman** *Plumbing* op cit 15–19.
- 59 **Chrétien J** 1881 *Les odeurs de Paris: étude analytique des causes qui concourent à l'insalubrité de la ville et des moyens de les combattre* Baudry, Paris.
- 60 See **Molesworth H** 1997 Bathrooms and kitchens: cleaning house with Duchamp in **Lahiji and Friedman** *Plumbing* op cit 74–92
- 61 **Tucker P** 1982 *Monet at Argenteuil* Yale University Press, New Haven CT (quoted in **Frascina F Blake N Fer B Garb T and Harrison C** 1993 *Modernity and modernism: French painting in the nineteenth century* Yale University Press, New Haven CT 121). Historical evidence of poor water quality at Asnières is provided in **Belgrand E** 1875 *Direction des eaux et des égouts: rapport présenté à m le préfet sur le projet de dérivation des eaux d'égout, depuis l'embouchure du collecteur général d'Asnières, jusqu'à l'extrémité nord-ouest de la forêt de Saint-Germain* Gauthier-Villars, Paris; 1878 *La situation du service des eaux et égouts* Chaix, Paris; **Bourneville** *Le tout-à-l'égout et l'assainissement de la Seine* op cit; **Cabanon L** 1886 *Dépotoir et fabrique d'ammoniaque: l'infection de la Seine L'Abeille*, Neuilly; **Châtel** *Assainissement de la Seine* op cit.
- 62 **Bloch E** 1986 *The principle of hope* (original 1959; translated by N Plaiçe S Plaiçe and P Knight) MIT Press, Cambridge MA; **Collier P and Lethbridge R** eds 1994 *Artistic relations: literature and the visual arts in nineteenth-century France* Yale University Press, New Haven CT; **Crossley C** 1993 Romanticism and the material world: mind, nature and analogy in **Rigby** *French literature, thought and culture in the nineteenth century* op cit 9–22; **Halperin J U** 1988 *Félix Fénéon: aesthete and anarchist in fin-de-siècle Paris* Yale University Press, New Haven CT; **Kelly M** 1993 Materialism in nineteenth-century France in **Rigby** *French literature, thought and culture in the nineteenth century* op cit 23–41; **Nochlin L** 1989 Seurat's 'La grande jatte': an anti-utopian allegory in *The politics of vision: essays on nineteenth-century art and society* Thames and Hudson, London 170–93; **Schapiro M** 1935 Seurat and 'La grande jatte' *Columbia Review* 17 14–15.
- 63 See **Smith P** 1996 *Seurat and the avant-garde* Yale University Press, New Haven CT.
- 64 See **Green N** 1990 *The spectacle of nature: landscape and bourgeois culture in nineteenth-century France* Manchester University Press, Manchester. An important exception to the absence of 'work' from these riparian landscapes can be found in Monet's *Men unloading coal* (1875), which is reproduced in **Leighton J and Thomson R** 1997 *Seurat and the bathers* National Gallery, London 112.
- 65 See Raphaël Collin's (1884) *Summer* and Jean-Charles Cazin's (1881) *Riverbank with bathers* in **Leighton and Thomson** *Seurat and the bathers* op cit 103–4.
- 66 **Parent-Duchâtelet A J B** 1824 *Essai sur les cloaques ou égouts de la ville de Paris* Crevot, Paris. Other early explorations of the sewers include those by Brune-seau, Inspector-General of Health between 1805 and 1812; **Horeau H** 1831 *Nouveaux égouts proposés à la ville de Paris* Didot, Paris. See also **Chevalier** *Laboring classes and dangerous classes in Paris during the first half of the nineteenth-century* op cit; **Lécuyer B P** 1986 *L'hygiène en France avant Pasteur, 1759–1850* in **Salomon-Bayet C** ed *Pasteur et la révolution pastori-enne* Flammarion, Paris; **Murard L and Zylberman P** 1996 *L'hygiène dans la république: la santé publique en France, ou l'utopie contrariée 1870–1918* Fayard, Paris.
- 67 Quoted in **Bernheimer C** 1987 Of whores and sewers: Parent-Duchâtelet, engineer of abjection *Raritan: a Quarterly Review* 6 72–90. The word 'putrid', so often used by Parent-Duchâtelet and others in reference to the Paris sewers, is derived from the Latin word *puta* meaning whore. Parent-Duchâtelet was a critical early figure in the emergence of what one might term 'medical hygienics', and was a founder of the influential periodical *Annales d'Hygiène Publique et de la Médecine Légale* in 1829. The term *Cloaca maxima*, which also has an explicitly gendered etymology, is used by Baron Haussmann in **Haussmann** *Second mémoire sur les eaux de Paris* op cit 107.
- 68 A classic example is **Michelet J** 1859 (reprinted 1981) *La femme* Flammarion, Paris. See also **Callen A** 1993 Immaterial views? Science, intransigence and the female spectator of modern French art in 1879 in **Rigby** *French literature, thought and culture in the nineteenth century* op cit 184–97; **Corbin A** 1990 *Women for hire: prostitution and sexuality in France after 1850* (original 1978; translated by A Sheridan) Harvard University Press, Cambridge MA; **Green** *The spectacle of nature* op cit; **Struminger L S** 1979 L'ange de la maison: mothers and daughters in nineteenth-century France *International Journal of Women's Studies* 2.
- 69 **Leighton and Thomson** *Seurat and the bathers* op cit; **Illich H₂O and the waters of forgetfulness** op cit.
- 70 Examples of water-based statues of the female nude completed during the Second Empire include the reconstruction of Lescot's Fountain of the Nymphs in the Place des Innocents and the Place Louvois. Leading architects in Second Empire Paris include Hitorff and Rohault de Fleury, both of whom revived earlier styles favoured by Louis XVI in their design of public spaces and monuments. See **Chadwick G F** 1966 *The park and the town: public landscape in the nineteenth and twentieth centuries* Architectural Press, London 152–62; **Hitchcock H-R** 1977 *Architecture: nineteenth and*

- twentieth centuries Yale University Press, New Haven CT 197; **Loyer F** 1988 *Paris nineteenth century: architecture and urbanism* (translated by C L Clark) Abbeville Press, New York; **Masson F and Gaillard M** 1995 *Les fontaines de Paris* Martelle, Amiens; **Moore C W and Lidz J** 1994 *Water and architecture* Thames and Hudson, London; **Morizet** *Du vieux Paris au Paris moderne op cit*; **Woolf P** 1988 Symbol of the second empire: cultural politics and the Paris Opera House in **Cosgrove D and Daniels S** eds *The iconography of landscape: essays on the symbolic representation, design and use of past environments* Cambridge University Press, Cambridge 214–36; **Van Zanten D** 1994 *Building Paris: architectural institutions and the transformation of the French capital 1830–1870* Cambridge University Press, Cambridge.
- 71 **Green** *The spectacle of nature op cit* 147. Late nineteenth-century Europe saw a sharpening of gender inequalities and differentiations, within which nature-based ideologies played an important role. See, for example, **Anderson B S and Zinsser J P** 1988 *A history of their own: women in Europe from prehistory to the present* Harper and Row, New York; **Roszak B and Roszak T** eds 1969 *Masculine/feminine: readings in the sexual mythology of women* Harper and Row, New York.
- 72 **Freud S** 1919 (reprinted 1985) The ‘uncanny’ in **Freud S** *Art and literature: Jensen’s ‘Gradiva’, Leonardo Da Vinci and other works. Volume 14* Penguin Freud Library, Harmondsworth 339–76.
- 73 For useful overviews of the emergence of the ‘uncanny’, see **Bresnick A** 1996 Prosopoetic compulsion: reading the uncanny in Freud and Hoffmann *Germanic Review* 71 114–32; **Castle T** 1995 *The female thermometer: eighteenth-century culture and the invention of the uncanny* Oxford University Press, New York; **Tatar M M** 1981 The houses of fiction: toward a definition of the uncanny *Comparative Literature* 33 167–82. For Martin Jay, a spatial reading of the uncanny is inherently gendered through ‘desire for a womb-like state of ontological security’, stemming from a polarity between the female body as nurturing and protective and as a threatening disturbance to a masculinist spatial order. Jay suggests that the most intense sense of the uncanny is rooted in a reunion with the mother’s body, and especially through the spatial disorientation of the ‘watery womb’ of the city. See **Jay M** 1995 The uncanny nineties *Salmagundi* 108 20–29.
- 74 **Brennan T** 1998 Psychoanalytic feminism in **Jaggar A M and Young I M** eds *A companion to feminist philosophy* Blackwell, Oxford 272–9; **Gatens M** 1996 *Imaginary bodies: ethics, power and corporeality* Routledge, London; **Irigaray L** 1989 The gesture in psychoanalysis in **Brennan T** ed *Between feminism and psychoanalysis* Routledge, London 135–55; **Silverman K** 1988 *The acoustic mirror: the female voice in psychoanalysis and cinema*, Indiana University Press, Bloomington; **Welton D** ed 1998 *Body and flesh: a philosophical reader* Blackwell, Oxford; **Vice S** 1998 Psychoanalytic feminist theory in **Jackson S and Jones S** eds *Contemporary feminist theories* Edinburgh University Press, Edinburgh 162–76; **Vidler** *Architectural uncanny op cit*.
- 75 Julia Kristeva explores the cultural significance of excrement as the ultimate abject object ‘expelled from the body’, a part of identity that becomes a defiling otherness with the intensified differentiation of boundaries and identity under modernity; see **Kristeva J** 1982 *Powers of horror: an essay on abjection* (original 1980; translated by L S Roudiez) Columbia University Press, New York; 1986 *Psychoanalysis and the polis* (original 1982; translated by M Waller) in **Moi T** ed *The Kristeva reader* Blackwell, Oxford 301–20. See also **Butler J** 1990 *Gender trouble: feminism and the subversion of identity* Routledge, London 134: [T]he boundary between the inner and outer is confounded by those excremental passages in which the inner effectively becomes outer, and this excreting function becomes, as it were, the model by which other forms of identity-differentiation are accomplished.
- Under modernity, we find a radical indeterminacy of bodies and nature, through the increasingly abstract and complex interactions in urban space and the dissolving of traditional conceptions of the organic cycle linking the body to social space. On the gendered dimensions of the experience of modernity (and their downplaying within the existing literature), see **Deutsche R** 1996 *Evictions: art and spatial politics* MIT Press, Cambridge MA 195–202; **Pollock G** 1988 *Vision and difference: femininity, feminism and the histories of art* Routledge, London; **Wolff J** 1985 *The invisible flâneuse: women and the literature of modernity* *Theory, Culture and Society* 2 37–48.
- 76 See **Sennett R** 1994 *Flesh and stone: the body and the city in western civilization* Faber and Faber, London.
- 77 **Corbin** *The foul and the fragrant op cit* 135; **Edholm F** 1993 The view from below: Paris in the 1880s in **Bender B** ed *Landscape: politics and perspectives* Berg, Providence RI 139–69; **Harvey** *Consciousness and the urban experience op cit* 94.
- 78 **Clark** *The painting of modern life op cit* 29, 45.
- 79 **Konvitz J W Rose M H and Tarr J A** 1990 Technology and the city *Technology and Culture* 31 284–94.
- 80 On the evolution of public health ideas, see **Coleman W** 1982 *Death is a social disease: public health and political economy in early industrial France* University of Wisconsin Press, Madison; **Delaporte** *Disease and civilization op cit*; **Gillet M** ed 1972 *L’homme, la vie et la mort dans le nord au XIXe siècle* Université de Lille III; **Goubert** *The conquest of water op cit*; **Hildreth M** 1987 *Doctors, bureaucrats and public health in France, 1888–1902* Garland, New York; **Jones S** 1992 Public hygiene and hygienists in Rouen (France) 1880–1930

- Unpublished PhD thesis, University of Cambridge;
- Leca A-P** 1982 *Et le choléra s'abattit sur Paris 1832* Albin Michel, Paris; **Murard and Zylberman** *L'hygiène dans la république op cit*; **Salamon-Bayet C** ed 1986 *Pasteur et la révolution pastoriennne* Payot, Paris.
- 81 Haussmann's urban geometry owed more to the imaginary cities of the Italian Renaissance than to the technical impetus of new advances in engineering science. Examine, for example, Antonio Averlino il Filarete's water-based design for the ideal city of Sforzinda (c 1457–64) in **Moore and Lidz** *Water and architecture op cit* 38.
- 82 Tautological conceptions of the relationship between modernity and the process of 'Haussmannization' are criticized in **Clark** *The painting of modern life op cit* 14.
- 83 **Gough J B** 1983 Lavoisier's memoirs on the nature of water and their place in the chemical revolution *Ambix* 30 89–106; **Lavoisier A-L** 1774 *Calculs et observations sur le projet d'établissement d'une pompe à feu pour fournir de l'eau à la ville de Paris Histoire de l'Académie Royale des Sciences, année 1771* 17–44; **Meldrum A N** 1932 Lavoisier's work on the nature of water and the supposed transmutation of water into earth (1768–1773) *Archeion* 14 246–7. See also **Hamlin C** 1990 *A science of impurity: water analysis in nineteenth-century Britain* Adam Hilger, Bristol.
- 84 **Belgrand E** 1875 *Les travaux souterrains de Paris II: les aqueducs romains* Dunod, Paris; **Haussmann** *Mémoires du Baron Haussmann op cit* 351–2.
- 85 See **Lavedan P** 1953 L'influence de Haussmann: 'l'haussmannisation' *Urbanisme et Habitation* 34 302–17; **Leonard C M** 1961 *Lyon transformed: public works of the second empire 1853–1864* University of California Press, Berkeley CA.
- 86 **Pinkney** *Napoleon III and the rebuilding of Paris op cit* 140.
- 87 Quoted in **Wilson E** 1991 *The sphinx in the city: urban life, the control of disorder, and women* Virago, London 37.
- 88 **Stallybrass P and White A** 1986 *The politics and poetics of transgression* Methuen, London. See also **Douglas M** 1984 *Purity and danger: an analysis of the concepts of pollution and taboo* Ark, London; **Sibley D** 1995 *Geographies of exclusion: society and difference in the west* Routledge, London.
- 89 The Haussmann era put in place a dual water system comprising a 'noble network' supplied by spring water for wealthy subscribers, and a second inferior network (using the dirty Ourcq canal, for example) for street cleaning, fountains and water services for the poor: see **Chatzis and Coutard** *Eau et gaz à tous les étages op cit*.