

9

From Palace to Hut: The Architecture of Military and Naval Medicine

Christine Stevenson

The walls separating medicine from society break down in this examination of early-British hospital architecture, which stresses the similarities and continuities between the civilian and the military. The hospitals examined include those for sick and wounded in the Empire, and later at home and those built for long-term chronic cases. Stevenson considers how matters of state, as well as medical theory and its changes, affected architecture.

The illustrations of the hut, Figures 9.1 and 9.2 overleaf, were published in 1813, by James Tilton (1745–1822), a former ‘Physician and Surgeon in the Revolutionary Army of the United States’. Tilton’s *Observations on Military Hospitals* includes some vivid recollections of the Revolutionary War, and more than thirty years later what he most remembered were the cold and the excrement. The latter was all over the camp at King’s Bridge, New York in 1776, and with it a ‘disagreeable smell’. ‘A putrid diarrhoea was the consequence.... Many died, melting as it were and running off by the bowels.’ When the enemy shifted, so did the Americans, who left their ‘infectious camp and the attendant diseases behind them’. It was remarkable, Tilton wrote, how the officers and men were ‘always more healthy in motion, than in fixed camps’ before they were ‘reduced to strict discipline and order’.¹

A very old understanding of disease underpins this account of the King’s Bridge ‘infection’. Even a smell that is merely disagreeable might also be deadly; it caused the putridity, which then killed the ‘melting’ men. Discipline, burying the faeces to be precise, had averted the threat and permitted stasis, the camp that could stay put.

Even so, the best accommodation for sick soldiers was always transient, in the sense of ephemeral. Tilton preferred tents, but they could not be used during the hard winter of 1779–80, so he had his cabin-hospital built of unhewn logs. The middle ward, just over thirty feet long, housed feverish

Figure 9.1

“Log military hospital” from J. Tilton’s Observations on Military Hospitals (1813). Courtesy: Wellcome Library, London.

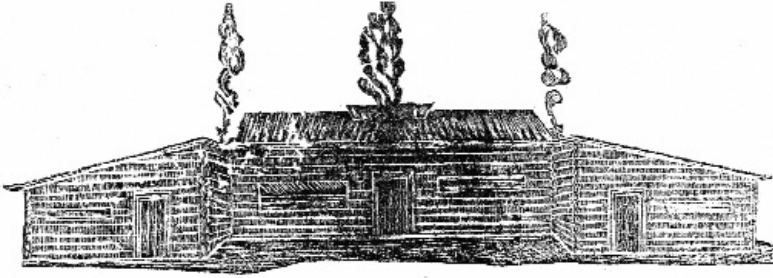
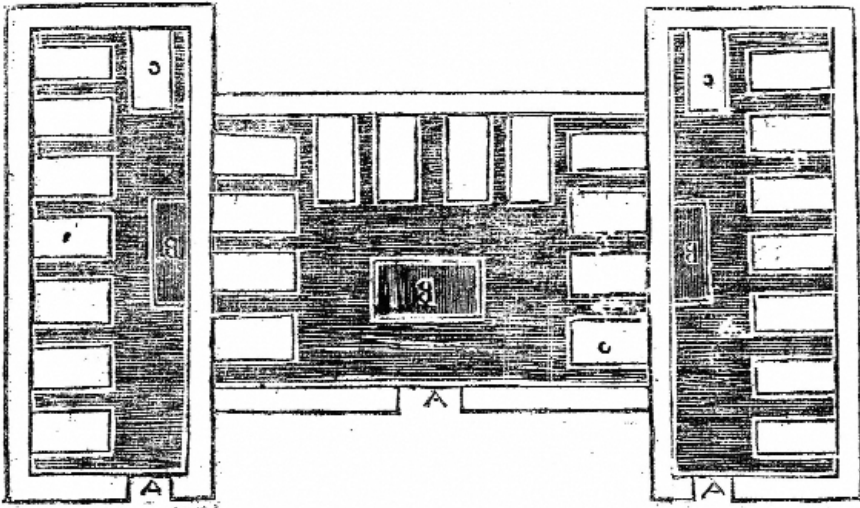


Figure 9.2

Plan of hospital’ from J. Tilton’s Observations on Military Hospitals (1813). Courtesy: Wellcome Library, London.



patients, and the cross-wards were for the wounded and 'other cases of topical affection'. The earthen floor was a 'neutralising' or 'correcting' influence, and smoke from open fires escaped through holes in the roof, combating infection on the way. Tilton explained that this was all 'upon the plan of an Indian hut', and that in it he could safely accommodate many more sick than could normally be kept in a space this size, that is, in a less primitive house.²

This survey of military and naval hospital architecture begins with the 'palaces', the great veterans' hospitals begun in the late-seventeenth century. Chelsea and Greenwich were not clinical hospitals, but the distinction was not maintained in the period, at least not in the latter's case, and in some ways these large and expensive complexes do not differ as much from Tilton's hut as we might assume. My major examples of clinical hospitals will be those built by the Navy on the Haslar peninsula near Portsmouth in Hampshire (1746–61) and at Plymouth, Devon (1758–62), for they were the century's major examples. The Army did not build general hospitals, as opposed to relatively small, regimental establishments, until the end of the century,³ but it produced the writers, whose influence extended well beyond their professional sphere. The British Army physicians, or former physicians, John Pringle, Richard Brocklesby, and Donald Monro were Tilton's acknowledged inspirations, and their writings will, at the end of this essay, bring us back to the virtues of transience.

The palaces

Though it had forerunners – in 1641 the young John Evelyn (1620–1705) greatly admired Amsterdam's Soldatengasthuis, a 'Hospitall for... lame and decrepid souldiers'⁴ – the Hôtel des Invalides in Paris, founded in 1670, effectively inaugurated the veterans' hospital as a building type. A very concrete manifestation of the 'military revolution', it was an idea whose time had come.⁵ Yet the Invalides' importance as a model also owed much to the skill with which it was publicised as a direct manifestation of Louis XIV's loving charity and martial valour.⁶ The combination probably intrigued Charles II, and the architecture certainly did. The Duke of Monmouth twice viewed the great work in progress on his father's behalf, and William Robinson (1645–1712), Surveyor-General to the Army in Ireland, was in 1677 very likely sent to inspect the Invalides too.⁷ Three years later work began, to Robinson's designs, on the Royal Hospital at Kilmainham near Dublin, in effect, the first of the English veterans' hospitals.

Kilmainham adhered more closely to the French prototype than the Chelsea and Greenwich hospitals would. It was – and, as the Irish Museum of Modern Art, still is – a quadrangle formed by wings consisting of rows of rooms, with two beds to a room, and two men to a bed, fronted at ground

level by an open arcade and above by a closed gallery, or corridor. This arrangement is like that of some of the Invalides' wings, though the latter has many quadrangles, and the resemblance between the two extends to some ornamental details.⁸

Veterans' hospitals had a particular meaning in a reign that had begun with a regicide; not for nothing was Kilmainham's chapel dedicated to King Charles the Martyr. In scouting for funds for the next, at Chelsea, Charles II explained that he had often and 'with great grief observed that many of our loyal subjects, who formerly took up arms for us, our royal father of blessed memory, to resist that torrent of prosperous rebellion, which at last overturned this monarchy, & Church', were now reduced to such 'extreme poverty' that some were forced to beg for their bread.⁹ In this way, the King explained in-pensioning as his patriarchal duty. The hospitals were, in this specific sense, palaces; regal houses offering charitable hospitality to poor and loyal dependents.

Palatialness was not only metaphorical or symbolic. At Chelsea, begun in 1682, Christopher Wren (1632–1723) opened up the Invalides' and Kilmainham's quadrangles to make a U-shape facing the Thames, with ward wings at right angles to, but narrowly separated from, the central range with its chapel and hall. The display was entirely appropriate to what King Charles called 'so pious, & charitable a work' stemming from 'our own royal bounty'.¹⁰ The river provided both convenient transport and the position from which the Royal Hospital appears to best advantage, and for the same reasons this is how London's royal palaces were then planned, although they were not built. It was a dim era for real palaces, but a brilliant one for these surrogates.

At the same time, Chelsea's shape allows more light and air to reach the men's galleries than a quadrangular arrangement would, and we can infer that this was part of Wren's reasoning.¹¹ The inference is in no way anachronistic. Like his friend Robert Hooke (1635–1703), another scientist–architect, Wren had keenly investigated the effects of air, and of the lack of air, on the human body. More generally, sunlight and clean air in gentle motion were central to the early modern understanding of a healthy environment, in part because of a fear of pathogenic smells, which James Tilton shared.¹² In one respect, Wren's hospitals' accommodation resembled that of the best clinical hospitals of their day: they provided 'cabins' or bed-cubicles, as Kilmainham and the Invalides did not. Compare, for example, a civil hospital in Rotterdam, where Wren's future acquaintance the naval surgeon James Yonge (1647–1721) found himself a prisoner-of-war in the mid-1660s. Yonge admired this 'fair house' with its long high wards, where the 'beds were enclosed like cabins... each having a window in it'.¹³ The cabins offered privacy and warmth as required. A similar type was used at a

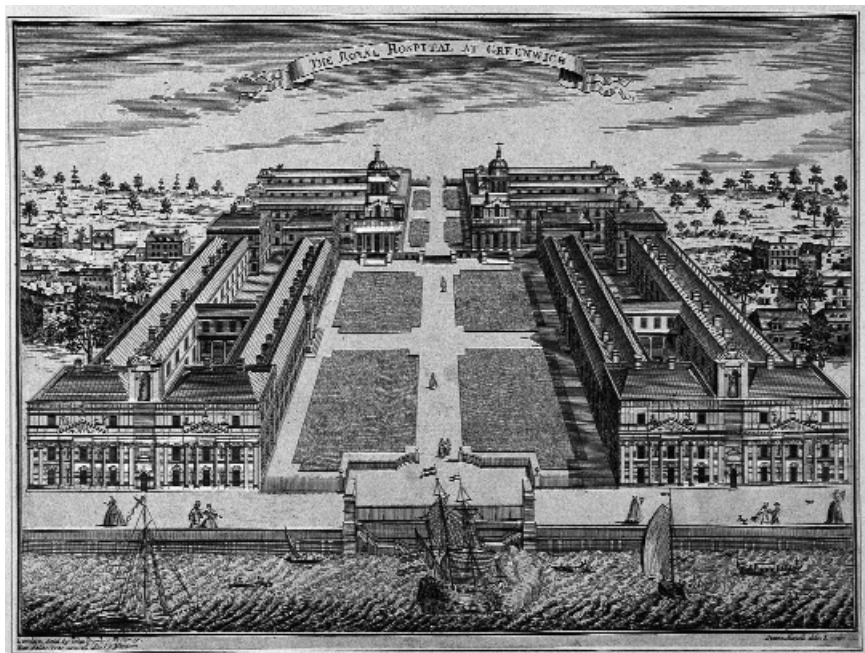
garrison hospital built in Portsmouth in the early 1680s, where each bed formed its own enclosure, '4 foot wide by 6 foot 3 inches long.... In front of each curtain rods with two hooks and a corni[ce] at the top of each bedstead', which was eight feet high.¹⁴ These beds were narrower but a little longer than Chelsea's cabins, designed a year or so later, which line each side of the ward-ranges' partition walls. Most comparable to Chelsea was the recent example of Hooke's rebuilding (1674–6) of London's Bethlem Hospital for the Insane, the other great hospital-construction project of Charles II's reign. Nearly six hundred feet long, Bethlem comprised rows of individual 'cells', a word also used for Chelsea's cabins. These were fronted by galleries serving as day-rooms, an institutional innovation that Wren adopted for his hospitals.

The construction of the Royal Hospital for sailors began in 1694, appropriately enough with Wren's conversion of the building designed by John Webb (1611–72) for a new Greenwich Palace, although this project was abandoned in 1670. What is now called the King Charles Building comprises Webb's original range, whose long thin rooms lent themselves nicely to their new purpose, and the new 'Base Block', lying parallel across a narrow court.¹⁵ Wren's intention was always to balance the King Charles Building with another, named for Queen Anne, but on paper he experimented with different arrangements for the rest of the complex. One would have had twelve detached ward blocks – plus another pair for the chapel and the dining halls – in two parallel rows behind the Charles and Anne buildings; and the Greenwich Directors took another, smaller scheme, with a total of six blocks, seriously enough to have it engraved for subscribers in 1699.¹⁶ Though for unknown reasons free-standing blocks were rejected soon afterwards, in favour of the three-sided King William and Queen Mary buildings which stand today, this project remained in circulation because pirated copies of the 1699 engraving were published until the early-1730s (Figure 9.3, overleaf). This was long after the hospital's final form was fixed, though two decades before it was finished.

These unexecuted designs are interesting because with them Wren departed from the palatial model.¹⁷ Chelsea's planning struck a balance of sorts between the regal and the utilitarian, and as it was built, Greenwich did too. Even so, its 'parts' might be called, as Samuel Johnson did, 'too much detached to make one great whole',¹⁸ and the early projects look frankly institutional to modern eyes. They have even been heralded as an anticipation of the 'pavilion' plan, which began to dominate hospital construction in the 1860s and remained the norm until well into the twentieth century.¹⁹ They are not, however, in as much as pavilion wards are large open wards, and for healthy pensioners Wren planned a more complex arrangement of open-topped cabins in six-cabin rooms, which was retained

Figure 9.3

Greenwich as engraved by Sutton Nicholls in 1728, even though the arrangement of rear blocks in parallel had long been abandoned.
Courtesy: Wellcome Library, London.



in the Queen Mary and King William buildings as they were constructed. He did, of course, appreciate that detached buildings are safer than contiguous ranges in case of fire, and generally easier to light and ventilate. Isolated blocks could also be added gradually, as the money came in, and money was usually a problem during Greenwich's construction. For all these reasons they were used for the rebuilding of St Bartholomew's Hospital in London, beginning in 1730, and in 1751 they were planned for the London Hospital, which did not build them, and six years later for the naval hospital at Plymouth, which did. At Plymouth, these blocks offered another advantage. Unlike the veterans' and the civil hospitals, it regularly accepted cases of 'infectious' and/or 'contagious' diseases, which could be isolated in their own blocks.

Though they were readily available to see in engraved form, Wren's detached ward buildings need not have inspired these later designs: they had

the self-evident advantages just mentioned. However, Greenwich would not have been ruled out as an architectural model simply because it was not a clinical hospital – or rather, was more than a clinical hospital. The distinction was explicitly dismissed by John Aikin (1747–1822), whose *Thoughts on Hospitals* (1771), was widely read until the early-nineteenth century. Aikin recommended Greenwich as a model for hospitals for the acutely ill, with the proviso that these patients would require a greater volume of circulating air and hence larger wards than for the aged and infirm.²⁰ He was clearly referring to the regular accommodation, and not to the separate Infirmary built between 1762 and 1768 to the designs of James Stuart (1713–88), but its planning was not dissimilar.²¹ Among the laity, Greenwich and Chelsea prompted a mild and evergreen joke: because they seemed ‘more fitted, by their grandeur and extent, for the residences of kings’, while the palaces looked like pauper hospitals, foreigners were often confused.²²

The naval hospitals

The Portsmouth garrison hospital, which measured one hundred and twenty by thirty-five feet overall, was an exceptional undertaking. Personally encouraged by Charles II, whose coat of arms it bore prominently, its construction was financed by the sale of £1,500, worth of timber from ‘dotard & decayed trees’ from the royal New Forest.²³ Though, at forty beds, its capacity was no greater than that of other regimental hospitals, they were more modest; and the hospitals following the Army’s domestic and overseas manoeuvres occupied rented accommodation, or tents. It is to the Navy that we must look for new construction on any scale in this period.

The first of the purpose-built naval hospitals was at Port Mahon, Minorca, where in 1711 work began on a replacement for the sick-quarters set up a few years previously.²⁴ Minorca’s hospital was, however, unique until the 1740s, when others were built on Jamaica and Gibraltar and begun on the Haslar peninsula.

As hospitals, these buildings had to be open to light and air, and as naval hospitals they had to secure their patients. The men were prone to ‘run’, or desert, or at least to wander off in search of a game and a drink, now defined as medical as well as disciplinary problems – they gambled away their clothes. Conflicting *desiderata* dictated a standard type, which was at first intended for Haslar too. Both the Jamaica and the Gibraltar hospitals consisted of the ‘large Quadrangle[s], with a spacious piazza within’ that the Admiralty specified for Haslar in mid-1745: that is, a great hollow rectangle whose wards’ inner or ‘piazza’ sides were lined with arcades or colonnades.²⁵ These formed open but sheltered galleries, which served the staff for circulation and the men for healthful strolling, ‘giv[ing] them Air’, as the

architect Nicholas Hawksmoor (1661–1736) explained Greenwich's equivalent colonnades.²⁶ The enclosure of the whole was to prevent running. The hospitals at Haslar and Plymouth retained the piazzas and the galleries, but abandoned physical enclosure.

Fever of one kind or another was the immediate stimulus for Britain's first programme of state hospital construction. It was endemic in the West Indies. The Jamaica hospital, which to discourage desertion was built beside a lagoon, was ordered moved and rebuilt in 1756: the site was disastrously conducive to outbreaks of 'intermittent' fever, malaria.²⁷ Equally terrifying was the 'continued' and 'malignant' fever, today identified as typhus, which swept through the British fleet between 1739 and 1741. The epidemic was understood to have started in the London prisons, and to be spreading with the mass impressment and mobilisation that attended the outbreak of hostilities with Spain. Though it did not admit its first patients until 1754, the hospital at Haslar was a 'monument to the disasters of 1740 and 1741', as Daniel Baugh has explained.²⁸

Fever epidemics had long been observed among close populations: a favourite historical example, in the eighteenth century, was the deadly outbreak at the Oxford Assizes of 1577.²⁹ As explained in the final part of this essay, it was John Pringle who, beginning in the early-1750s, led the world to understand that the diseases still variously named for the environments which engendered them – the (army) camp, ship, hospital, and jail fevers – were one and the same. They comprised the continued, malignant, and/or 'putrid' fever today identified with louse-borne typhus (though loosely identified – contemporary reports accord with this mechanism of transmission, but the symptomatology is not always a perfect fit). The fever became more common over the course of the century in England, as armies and fleets were mobilised in greater numbers, towns grew, and residential institutions were built. It did not, however, become a regular problem in prisons or civil hospitals until the 1770s, when overcrowding became a regular problem; their architectural reform followed. Though the evidence is circumstantial, it seems as if the naval hospital planners, working in the wake of the epidemic of 1739–41, and of course aware that these hospitals must (unlike their civil counterparts) admit men already suffering from the fever, seem to have been particularly alert to the danger it presented, especially after Pringle's books began appearing.

The Royal Naval Hospital at Haslar was also a monument to far-reaching changes in naval–medical organisation that began around 1740. The new hospital's management, including its provisioning, was to rectify the long-acknowledged defects of the 'contract' system, now joined by another: hired hospitals and sick-quarters were clearly incapable of coping with a severe epidemic. As a building, the hospital was clearly preferable to those other

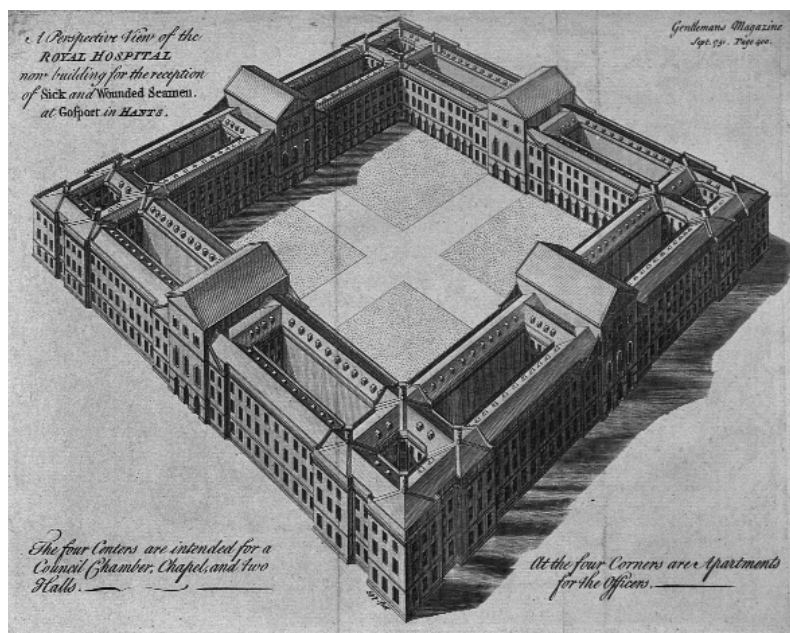
royal hospitals, those on ships.³⁰ Hospital ships were excellent at reducing desertion, and could, when necessary, isolate cases of communicable disease, but because they were ships they were damp and malodorous, at a time when moisture and smells were believed to be powerful contributory, and even direct, causes of scurvy and the fever.³¹

When, in June 1745, the Admiralty informed the Commissioners for Sick and Wounded Seamen of the acquisition of the Haslar site, it handed over to them the hospital's 'Inner Parts', instructing them 'to consider attentively to the disposition, Situation, & Dimension of the Wards for sick Men, the Convenience of Light and Air; To avoid narrowness, as also crowding the Beds too close together'.³² The three naval Boards were feeling their way around this new problem of building hospitals – which were, moreover, enormous by civilian standards – and the Admiralty asked the London merchant Theodore Jacobsen (d.1772) to look at the plan drawn up by the Navy Board's Surveyor Sir Jacob Ackworth. Amateur status was no disqualification for an architect then – Jacobsen had just designed the large new building for the Foundling Hospital, an orphanage, in London – and he might, the Admiralty hinted to the Commissioners, be more disinterested, as well as better qualified, than the widely-loathed Ackworth.³³ Not 'entirely approving' of Ackworth's plan, Jacobsen devised another, 'which he believes may be better for the Purpose'.³⁴

The hospital at Haslar, begun in 1746, was handsomely illustrated in the *Gentleman's Magazine* five years later (Figure 9.4, overleaf). In the engraving we can see how the courtyard was lined, at ground-floor level, by arcading; and from it we can understand how each wing was formed by a pair of narrow ward ranges, rather like Greenwich's King Charles and Queen Anne buildings (seen in Figure 9.3). The picture does not, however, show Haslar as it was built. Sometime before early-1756 it was decided to substitute a wall with a gate for one of the wings, and in this way a quadrangular hospital approximating what was, after Gibraltar's and Jamaica's, becoming the standard naval type, took the form of a U.³⁵ The wing's omission saved money: what was immediately recognised as England's biggest brick construction would, when finished, even with three wings, cost around £100,000 – James Lind estimated in 1758 – two-and-a-half times the original prediction.³⁶ Other alterations are not so easily explained. Between 1756 and 1762, when the hospital was finished, it was decided to clear the narrow courts between the ward ranges in what were, now, the side wings. The buildings which Figure 9.4 shows in the centres of these wings were, in construction, replaced by pairs of free-standing blocks for storage, which face one another across the narrow inner courts. Two storeys high, they are a floor lower than the stacks of wards on either side and hence, according to the description published by the surgeon Johann Hunczovsky (1752–98) in

Figure 9.4

*The Royal Hospital at Haslar as published in 1751.
Courtesy: Wellcome Library, London.*



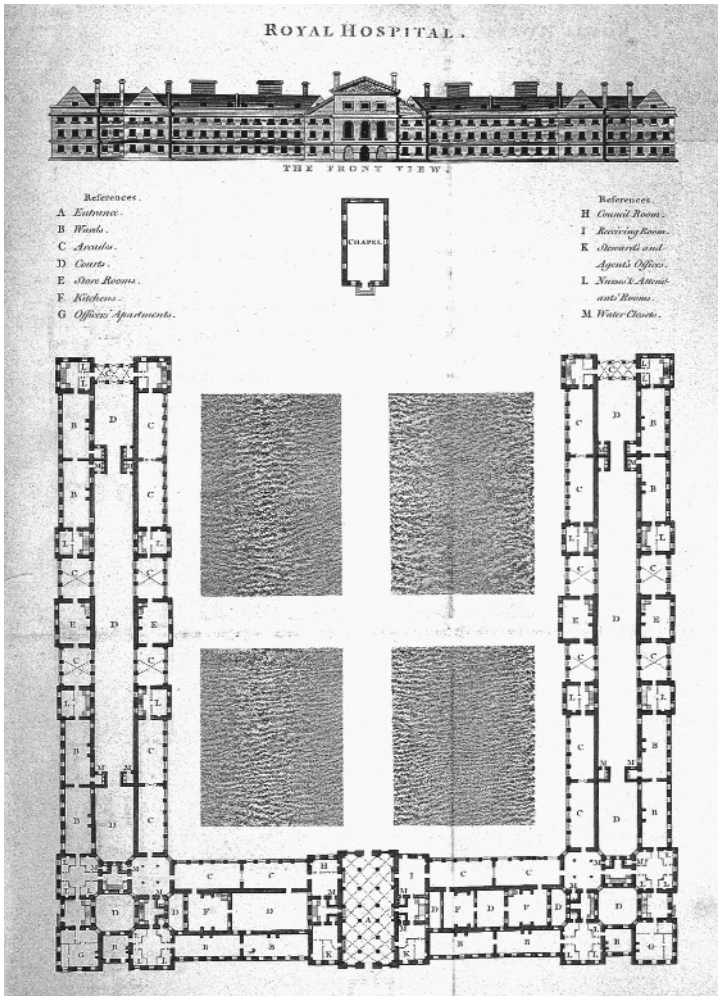
1783, did not interfere with air circulation.³⁷ After 1756, it was also decided to omit the kitchens, dining rooms, and stairs intended for the narrow courts (these are not shown in Figure 9.4), which meant that the wards could have more windows.

Between the storage and the ward blocks run terraces, resting on arcades; at ground level one could walk right through the side wings, under the terraces. Another Continental surgeon, Jacques Tenon (1724–1816) accordingly understood these wings, in 1787, as composed of pairs of isolated buildings – the end wards and the storage blocks – plus the wards attached to the central range (Figure 9.5).³⁸ The changes made to Haslar's plan during its construction, one way or another, all opened out, or perforated, the solid brick enclosure that was first envisaged. The result helped England's biggest hospital to enjoy, briefly, a reputation as its healthiest. Haslar was remarkable for the care with which it separated patients with different illnesses, and the clothing and bedding that they came into contact with, wrote Tenon, whose countryman Pierre-Jean Grosley had

From Palace to Hut

Figure 9.5

Haslar, from John Howard's Account of the Principal Lazarettos... (1789).
Courtesy: Wellcome Library, London.



seventeen years earlier summarised architecture's contribution to these separations. The hospital had a 'variety of apartments for the reception of the different sorts of patients, built in solitary pavillions', which served both 'to prevent a communication... [and] to promote a circulation [*renouvellement*]

of air'.³⁹ Though the description is more obviously applicable to the Navy's next hospital on home soil, it is not inappropriate.

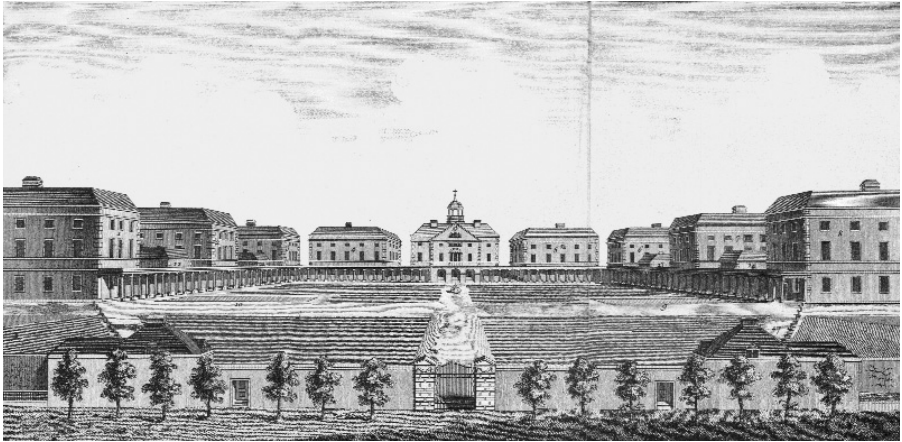
In July 1757, during the years of Haslar's construction, and changes to planned construction, the Admiralty minuted its approval of the plans put forward by the Navy Board for a hospital near Plymouth.⁴⁰ It admitted its first patients in early 1760, and the new Royal Hospital was finished just over two years later, about the same time as Haslar's was. At Plymouth, fifteen detached buildings were arranged around a square and linked by a colonnade lining it (Figure 9.6).⁴¹ The chapel faces the gate to the enclosure, both flanked by pairs of ward blocks. On each side are two more ward-blocks between lower, single-storey buildings for domestic offices. One also held wards for men suffering and recovering from smallpox, and another, cells for the insane, who would, like those at Haslar, be moved on to Bethlem in London.⁴²

According to Tenon, Plymouth's surgical patients were separated from the medical, and the latter according to whether they suffered from fever, ship fever, dysentery, scurvy, phthisis, scabies, or venereal disease, as well as smallpox and insanity.⁴³ Actively 'contagious' patients, including victims of smallpox and the malignant fevers and fluxes, were assigned to the highest wards at both hospitals. This was because 'infected' and otherwise vitiated air rises, or so it was understood, and because these men might be emanating morbid *effluvia*, nothing and no one could lie safely above them.⁴⁴ (They were also, of course, dangerous in direct contact; hence the care for the clothing and the bed linen too.) Convalescents occupied ground-floor wards, adjacent to their *promenades*.

Hunczovsky and, in particular, Tenon described the naval hospitals' architecture in greater detail than any native – including John Howard – then did, because they were the emissaries of regents with a special interest in the subject. Hunczovsky inspected English hospitals at Joseph II of Austria's behest, and Tenon was there on behalf of Louis XVI and specifically the Paris Académie des Sciences' commission entrusted with the re-planning of the Hôtel-Dieu. National and professional pride dictated that the establishments put their best foot forward. Hunczovsky saw Haslar's convalescents playing a 'kind of ball game' to build up their strength, but in 1780, around the time of his visit, the Navy's Comptroller Charles Middleton (1726–1813) reported that its over-'numerous and ungovernable' patients instead refreshed themselves with liquor smuggled in by their friends and relations. Its officers enjoyed no 'Dignity or respect'.⁴⁵ By the same token, however, the foreign surgeons' descriptions of the buildings are particularly useful. From them we can appreciate the hopes that their local informants had for architecture and its capacity for effecting, less with walls

Figure 9.6

*The Royal Hospital at Plymouth, from the French edition (1788) of Howard's State of the Prisons. Two ward-blocks at the front are omitted.
Courtesy: Wellcome Library, London.*



than with airy gaps, the necessary separations between different kinds of patients.

The hospital at Plymouth, was designed by Alexander Rovehead, or Rouchhead (d.1776), who was apparently from London.⁴⁶ His models do seem to have been metropolitan. Each floor of Plymouth's ward blocks consisted of two wards side-by-side, sharing a central chimney-stack, and in most cases, a front vestibule with its stairs, washtubs, and latrines. This planning resembles that of St Bartholomew's, the construction of whose fourth and final building (1757–69) coincided with Plymouth's, and it is even closer to that of the London Hospital. The London had rejected the detached ward blocks designed by Boulton Mainwaring (1702–78), but seems to have retained their internal arrangement for its new building, begun in 1752 and also still underway, whose plan was widely circulated.

Such resemblances were not pointed out at the time; the natural comparison was between the two naval hospitals. They look very different, but both formed great courts lined with galleries. Three storeys of doubled wards – end-to-end at Haslar, side-by-side at Plymouth – alternate with lower storage blocks, and the galleries between them were open on both sides, or were intended to be. At Plymouth, to cut the wind, a wall was built along the line made by the outer edges of the side pavilions, so the buildings were no longer entirely detached.⁴⁷ Even so, Plymouth was, its admirers thought, as fragmented and porous as any permanent, masonry hospital for

1,200 men could be. Its reputation was already fixed when, in 1788, Sir Joseph Banks (1743–1820) wrote that experience had shown that it was ‘probably the best construction of its type in the kingdom’. Though with one qualification – Plymouth’s wards should not have been doubled – the French students of the hospital type could find nothing better in the world.⁴⁸

In 1799, the third edition of the *Observations on the Diseases Incident to Seamen*, by Gilbert Blane (1749–1834), subjected the naval hospitals’ architecture to an unprecedented empirical comparison. It began with differences in their mortality rates during recent wars. Between 1793 and 1797, for example, Haslar’s rate was one in 14.3, significantly higher than Plymouth’s one in 24.7. Blane pointed out his controls: they were ‘equally well supplied with accommodations, diet and attendance’ and had the same kinds of patient, who each enjoyed equal volumes of space. The difference was presumably ‘owing to the difference in point of air’ and, even allowing for the local climates and soils, this point of air must rest on architecture:

Haslar hospital consists of one great center building, and four pavilions running backwards from each corner of it. These are placed in pairs, standing parallel and very close to each other lengthwise, so as to intercept the free course of air. ...Plymouth hospital consists of twelve separate similar and equal buildings, ranged in a large square, with wide intervals between each. Of these twelve, however, ten only are occupied by the sick.

Blane’s medical authority was John Pringle (1707–82), to whom we are indebted, he wrote, for placing the subject of pure air in such a ‘strong and instructive point of view’, that is, the hospital-planning point of view.⁴⁹ Pure air’s centrality to health was a truism as old as writings about health – recall the Admiralty’s instructions to the Commissioners for Sick and Wounded, in 1745, to consider the ‘Convenience of Light and Air’ at Haslar – but Blane was right. It was Pringle and his military followers, to whom we now turn, who had transformed the truism into a principle to be formulated through inductive reasoning. Their example prompted Blane’s empiricism, a way of analysing hospital buildings that had arrived to stay. Paradoxically, their writings also have a distinctively fervent, even mystical flavour, and that would be equally lasting.

Redemption through ruin

In May 1750, more than fifty Londoners died of the gaol fever after attending an Old Bailey courtroom, victims of ‘putrid streams from the bail dock’, in which stood two prisoners from Newgate.⁵⁰ Pringle’s *Observations on the Nature and Cure of Hospital and Jayl-fevers*, price one shilling, was printed thirteen days after the beginning of these, the ‘Black Assizes’. In this

pamphlet, the former Physician General to the forces in the Low Countries, and their hospitals, identified the outbreak with the fever he had observed among military populations. His *Observations on the Diseases of the Army in Camp and Garrison*, first published in 1752 and thereafter in many English, Italian, German, French, and American editions, expanded on the connection, remarking that the fever was, in effect, Britain's version of the 'true plague',⁵¹ and explained the measures necessary for its, and other diseases' – especially dysentery's – prevention and containment.

When Pringle described how 'poisonous effluvia of sores, mortifications, dysenteric and other putrid excrements' accumulate when sick and wounded men are gathered, and how ventilation would dilute and dispel these *effluvia*, his pioneering study of military hygiene was not breaking new ground.⁵² The mechanical 'ventilator' devised in 1741 by Stephen Hales (1677–1761), who also coined the word, had already been installed at a number of hospitals and jails for just this reason; and Pringle's own testimony played a big part in the invention's success. He, however, offered three corollaries of this observation about *effluvia*, which struck contemporary and later readers with considerable force. The first was the most general. When Florence Nightingale (1820–1910) famously wrote that the 'very first requirement of a hospital is that it should do the sick no harm', it was in a conscious, though unacknowledged, echo of Pringle's 'Among the great causes of sickness and death in an army, the Reader will little expect that I should mention... the hospitals'.⁵³ Secondly, the fuller the hospital, the bigger the danger. This maxim was generally applicable, and when generally applied had interesting implications for evaluating charitable 'success'. Beginning with John Aikin's *Thoughts on Hospitals* (1771), and the *Practical Remarks* (1776) by the American military surgeon John Jones (1729–91), it can be traced through subsequent attacks – some as political as they were medical – on the large London civil foundations until the early-nineteenth century, when James Tilton returned it to the military arena: the 'humane and benevolent design of large... hospital accommodation must necessarily be defeated in the execution... profusion and extravagance serve only to precipitate destruction and ruin'.⁵⁴

Pringle also showed the irony in a third, even more specific problem of hospitals, and this was that patients and their nurses shut the ward windows once the physician's or surgeon's back was turned. The solution was at first simple, if radical. Unless Hales's ventilator ensured that the flow of air in military-hospital wards was proof against this fatal foolishness, the best expedient was to 'lay the sick, if numerous, in churches, barns, or ruinous houses only, where neither they nor their nurses can confine the air'.⁵⁵

The *Observations'* fourth edition was published eight years later, in 1764. In it, the sick soldiers are still to be laid in the churches, barns, and ruinous

houses, but now 'unless the wards be uncommonly well aired', not ventilated with the help of Hales's machine.⁵⁶ Later editions keep this wording, which is suggestively unpecific. Military physicians had backed off from the ventilator, which was expensive, hardly portable, and, man-powered as it was, required stricter discipline than they could muster.⁵⁷ Uncommonly good airing would have to be achieved by other means. Given that some jurisdictions – notably London and the Navy – could not manage with small hospitals, let alone ruinous houses, this seemed to rule out the makeshifts, and throw the onus on to management and design. Though a firm advocate of the benefits of 'land air', James Lind (1716–94), for example, Haslar's Physician since 1758, decided that ventilators were unnecessary if ward windows were opened as often as possible, especially since they were opposite one another.⁵⁸

These wards got most, if not all of these opposed windows only in the late-1750s. Should we attribute the alterations made to Haslar's plan to Pringle's influence? Not in the (apparent) absence of documentation about the changes, but as two books newly published in 1764 show, his authority was becoming considerable.

The fourth edition of Pringle's *Observations* also stipulates for the first time that the sick were to be 'divided' from one another.⁵⁹ In his *Account of the diseases of soldiers serving on the Continent*, also published in 1764, Donald Monro (1727–1802) reinforced this stricture with exact figures. In churches and other lofty spaces, Monro wrote, one might allow thirty-six square feet per man, but forty-two to sixty-four square feet would be required in ordinary wards, depending on their height and the building's airiness and dryness.⁶⁰ Though volumetric specifications would soon be preferred, this was an important contribution to the methodology of institutional reform. However, *effluvia* could infect not just the men and their attendants, but buildings themselves, as Pringle had already suggested and Richard Brocklesby (1722–97) was then showing again in 1764, and no quantity of moving air would protect these sickening fabrics. With Brocklesby, Pringle's 'ruinous houses' began to take tangible form.

Brocklesby's *Observations... Tending to the Improvement of Military Hospitals* describes one of the 'close hovels, or miserable hospitals' he had been forced to use on the Isle of Wight in 1758: this level of corroborative detail, which Pringle also favoured, constituted another important contribution to reformist rhetoric. Four men put into the same corner died, poisoned one after the other. Only by scraping away at the floors and walls, and thereby 'substituting an intire new layer of the whole inside of the house', had Brocklesby managed to kill the infection. This was the bad hut; but he found the good one on another occasion, when, after cramming the sick into every house, barn, outhouse, and cottage that could be found,

'some Gentleman of the hospital' (was this Brocklesby himself?) 'proposed to erect a temporary shed with deal [softwood] boards, upon the open forest, and to have it thatched over with a coat of new straw'. The shed in the forest was big enough for 120 sick men and, though they were cold and wet there, remarkably fewer died of the same diseases, Brocklesby explained, than others under the same regimen did elsewhere, and convalescents recovered much sooner. Again, this time at Guildford, in 1760, when the putrid fever was rife, Brocklesby built a hut of wattle and thatch, big enough for forty. His 'mansions for the sick' could be quickly raised and destroyed as quickly again, if they became diseased; and by their very nature they could not be sealed against the air.⁶¹

The huts and ruined houses were always serendipitous. Pringle, Brocklesby, and Tilton did not (they implied) seek out such odd alternatives to hospitals, but were obliged to use them by the force of circumstance, after the windows were broken, and then discovered how well they worked.⁶² Well into the next century, astonishment remained conventional in these narratives of health restored within, and, by apparent ugliness, transience, and ruin, even as the paradox was applied to effect. The sick soldiers in the Crimea 'lay looking up at the open sky', wrote Nightingale in 1858, 'thro' the chinks – & slits' of their wretched huts and tents, and there twice as many survived than in the truly wretched enclosure of the massive Scutari Hospital, in Constantinople.⁶³ The old ardour survived.

Pringle had written that he found existing books of no use at all,⁶⁴ but Brocklesby had two: one was Pringle's and the other was God's. Leviticus, Brocklesby explained, tells us what to do about the filth produced by 'infirmaries, or hospitals, in all countries', in which the 'seeds of infection once sown, continue, in some instances, to spread infectious diseases, and to contaminate the house', much as Israelites' 'tents, or hutts' were 'infected with the filthy leprosy' during their journey to the Land of Promise. It was the priests, the men of learning, who adhering to Mosaic precept had done the right thing: scraped the walls and if necessary pulled down the entire leprous house and carried the materials right out of the settlement.⁶⁵ In 1953, Owsei Temkin traced the eighteenth century's definitive 'secularisation' of ancient notions about ritual pollution: the 'laws of the Bible imposing the ritualistic stamp of clean and unclean were now explained as wise sanitary prescriptions by a shrewd law-giver'.⁶⁶ Today, we are less inclined, in general, to view the Enlightenment as a purely secularising phenomenon, and can acknowledge the messianic fervour with which the military physicians explained their hovels.

They found a wide readership because their audience shared a vested, Christian interest in humility. Moreover, in the two decades after 1750, a period of increasing civil and naval-hospital construction and apparently

accelerating fevers, they offered an architectural ‘type’ in the strict, even theological, sense. The hut was not a model to be copied, at least not away from the encampments, but a prophetic or symbolic illustration of what hospitals could be. Christopher Wren would have appreciated the distinction, but he would have been even more pleased that great public buildings were still – as he put it – the ‘Ornament of a Country’.⁶⁷

Notes

1. J. Tilton, *Economical Observations on Military Hospitals; and the Prevention and Cure of Diseases Incident to an Army* (Wilmington: J. Wilson, 1813), 32–3.
2. *Ibid.*, 48–9.
3. H. Richardson (ed.), *English Hospitals 1660–1948: A Survey of their Architecture and Design* (Swindon: Royal Commission on the Historical Monuments of England, 1998), 87, from a chapter on the hospitals of the armed forces which provides a very useful overview on the basis of original research. See also the references (indexed) to hospitals in J. Douet and A. Saunders, *British Barracks 1600–1914: Their Architecture and Role in Society* (Norwich: The Stationery Office, 1998).
4. J. Evelyn, *Diary*, E.S. De Beer (ed.), 6 vols (Oxford: Clarendon Press, 1955), Vol. 2, 45. See also A.P.M. Langeveld, ‘The Development of the Military Hospitals in the Netherlands’ Army Medical Service’, in Y. Kawakita, S. Sakai, and Y. Otsuka (eds), *History of Hospitals: The Evolution of Health Care Facilities*, Proceedings of the 11th International Symposium on the Comparative History of Medicine – East and West (Tokyo: Taniguchi Foundation, 1989), 89–126.
5. For the ‘military revolution’ and its historiography see J. Black, *European Warfare, 1660–1815* (New Haven and London: Yale University Press, 1994), 3–9. Black argues for dating it to circa 1660–1720, a reperiodisation which, though he does not discuss them, accords nicely with the construction of the first veterans’ hospitals.
6. Notably by Le Jeune de Boulencourt’s *Description Générale de l’Hôtel Royal des Invalides Etabli par Louis Le Grand... Avec les Plans, Profils et Elevations de Ses Faces, Coupes et Appartements* (Paris, 1683), discussed in C. Stevenson, *Medicine and Magnificence: British Hospital and Asylum Architecture, 1660–1815* (New Haven and London: Yale University Press, 2000), 68–9.
7. *Ibid.*, 69; R. Loeber, *A Biographical Dictionary of Architects in Ireland 1600–1720* (London: John Murray, 1981), 89.
8. M. Craig, *The Architecture of Ireland from the Earliest Times to 1880* (London and Dublin: B. T. Batsford and Eason, 1982), 153–5; E. McParland, *The Royal Hospital Kilmainham, Co. Dublin: A National Centre for Culture and the Arts in Ireland* (Dublin: Irish Architectural Archive, [1985]).

From Palace to Hut

9. Quoted in G. Hutt (ed.), *Papers Illustrative of the Origin and Early History of the Royal Hospital at Chelsea, London* (London: Eyre & Spottiswoode, 1872), 14 (spelling modernised); from Charles's letter of October 1684 to William Sancroft, Archbishop of Canterbury and the King's former chaplain.
10. *Ibid.* M. Binney, 'The Royal Hospital, Chelsea', *Country Life* clxxvii (1982), 1474–7, 1582–5, on 1476, draws wider parallels with palaces as part of a useful account of Chelsea's architecture.
11. M. Whinney, *Wren* (London: Thames & Hudson, 1971), 147, who also describes Wren's six-ward-block plan for Greenwich as allowing the 'interiors the maximum of light and air' (188).
12. A. Wear, 'Making Sense of Health and the Environment in Early Modern England', in A. Wear (ed.), *Medicine in Society: Historical Essays* (Cambridge: Cambridge University Press, 1992), 119–47, on 141, 145–7.
13. F.N.L. Poynter (ed.), *The Journal of James Yonge (1647–1721), Plymouth Surgeon* (London: Longmans, 1963), 98, and see 200 for his introduction (by Robert Hooke) to Wren in 1686.
14. Nigel Barker found two contracts from 1681 relating to this hospital ('The Architecture of the English Board of Ordnance 1660–1750', 3 vols [unpublished PhD dissertation, University of Reading, 1985], Vol. 1, 288–91), the only one built by the Ordnance on home soil during his period. C.G.T. Dean, 'Charles II's Garrison Hospital, Portsmouth', *Papers and Proceedings of the Hampshire Field Club and Archaeological Society* 16 (1947), 280–3, describes what remained of it in 1947. Enclosed beds became suspect, as impediments to ventilation, in the 1760s (Edward Foster, *An Essay on Hospitals. Or, Succinct Directions for the Situation, Construction, and Administration of Country Hospitals* [Dublin: the author, 1768], 25) and twenty years later the Commissioners for Sick and Wounded Seamen recommended that they be abandoned at naval hospitals overseas, though in equivocal terms. No longer was the patient to be spared the 'dying looks of his companion': quoted Richardson (ed.), *op. cit.* (note 3), 82.
15. J. Bold, *Greenwich: An Architectural History of the Royal Hospital for Seamen and the Queen's House* (New Haven and London: Yale University Press, 2000), 98–108.
16. Stevenson, *op. cit.* (note 6), 74–5, 77 reproduces Wren's plan drawing for the twelve ward-block project and the perspective and plan engraved in 1699.
17. With the intriguing exception of the palace of Marly, built (1679–84) for Louis XIV as a private retreat in thirteen pavilions, and used later in the century to explain pavilion-hospital planning: *ibid.*, 190. He also departed from the Invalides model, otherwise still influential in England: John Bold, 'Comparable Institutions: The Royal Hospital for Seamen and the Hôtel des Invalides', *Essays in Architectural History Presented to John Newman. Architectural History* xlv (2001), 136–44.

18. In 1763: James Boswell, *The Life of Samuel Johnson*, 2 vols (London: Robert Rivière, [1906]), Vol. 1, 284.
19. Specifically, the largest, with the fourteen blocks: *The Sixth Volume of the Wren Society ... The Royal Hospital for Seamen at Greenwich 1694–1728*. A.T. Bolton and H.D. Hendry (eds) (Oxford: University Press for the Wren Society, 1929), 97; J.D. Thompson and G. Goldin, *The Hospital: A Social and Architectural History* (New Haven and London: Yale University Press, 1975), 149; T.A. Markus, *Buildings and Power: Freedom and Control in the Origin of Modern Building Types* (London and New York: Routledge, 1993), 117–18.
20. J. Aikin, *Thoughts on Hospitals* (London: Joseph Johnson, 1771), 20. The book, which was translated into French in 1777, perhaps prompted Jean-Noël Hallé's characterisation of Greenwich as one of three older hospitals 'dignes de servir d'exemple' of hospital construction (the other examples were French): 'Air. Hygiène' in F. Vicq d'Azyr (ed.), *Encyclopédie Méthodique... Médecine*, (Paris: Panckoucke, 1787), 492–590: 575. French visitors were however independently impressed by the healthiness of its architecture (enhanced by an impressive standard of housekeeping): [P.-J.] Grosley, *A Tour of London; Or, New Observations on England, and its Inhabitants*, trans. Thomas Nugent, 2 vols (London: Lockyer Davis, 1772), Vol. 2, 42; J. Tenon, *Journal d'Observations sur les Principaux Hôpitaux et sur Quelques Prisons d'Angleterre*, J. Carré (ed.) (Publications de la Faculté des Lettres et Sciences Humaines, n.s. 37. Clermont-Ferrand: Université Blaise-Pascal, 1992), 65–71.
21. For this building, which later housed the Dreadnought Seamen's Hospital and survives in altered form, see the National Monuments Record (Swindon) file no. 101280, and Bold, *op. cit.* (note 15), 206–20. Greenwich's exact role in the development of the modern hospital type remains uncertain, but it was bigger than was once assumed, at least by architectural historians, who used to adduce only Wren's unexecuted designs (see the references at note 19, above). Naval-medical historians did not assume this: see, for example, C. Lloyd and J.L.S. Coulter, *Medicine and the Navy, 1200–1900*, Vol. 3, 1714–1815 (Edinburgh and London: E. & S. Livingstone, 1961), 207, on Haslar's debt to Greenwich's architecture, an hypothesis also advanced in Richardson, *op. cit.* (note 3), 79.
22. [T. Faulkner], *An Historical and Descriptive Account of the Royal Hospital... at Chelsea* (London: T. Faulkner, 1805), 46.
23. Even so, the building had become a barracks by 1694: Dean, *op. cit.* (note 14), 283.
24. On this hospital, which survives in part, see J.G. Coad, *Historic Architecture of the Royal Navy: An Introduction* (London: Gollancz, 1983), 31, 143–5; and E. Buchanan, 'Naval Hospital Architecture in the Eighteenth Century'

- (unpublished MA Dissertation, Courtauld Institute, London, 1996), 12–15; thanks to the latter for allowing me to cite her dissertation here. It does not form a closed quadrangle, but its siting on an island in the harbour answered the problem of security.
25. National Maritime Museum (henceforth, NMM) ADM/E/11 (Commissioners for Sick & Hurt Seamen. In Letters from the Admiralty, 1744–5), not numbered, filed after (20.), 18 June 1745. Lloyd and Coulter, *op. cit.* (note 21), 101–4 and D. Baugh, *British Naval Administration in the Age of Walpole* (Princeton, NJ: Princeton University Press, 1965), 217–18 describe the Jamaica hospital. For the Gibraltar hospital (which survives) completed in 1756, see C. Lawrance, *The History of the Old Naval Hospital Gibraltar 1741 to 1922* (Lymington: C. Lawrance, 1994) and Coad, *op. cit.* (note 24), 145–7.
 26. N. Hawksmoor, *Remarks on the Founding and Carrying On the Buildings of the Royal Hospital At Greenwich* (London: N. Blandford, 1728), 16.
 27. S. Gradish, *The Manning of the British Navy during the Seven Years' War* (London: Royal Historical Society, 1980), 186; P.K. Crimmin, 'The Sick and Hurt Board and the Health of Seamen, c.1700–1806', *Journal for Maritime Research* (December 1999), <http://www.jmr.nmm.ac.uk/server/show/conJmrArticle.12>.
 28. Baugh, *op. cit.* (note 25), 51, and see 179–86, 216–22 for the epidemic's impact on manning and hospital construction.
 29. R. Evans, *The Fabrication of Virtue: English Prison Architecture 1750–1840* (Cambridge: Cambridge University Press, 1982), 95, at the beginning of an excellent chapter on 'Gaul Fever'; see also M. DeLacy, *Prison Reform in Lancashire, 1700–1850: A Study in Local Administration* (Stanford: Stanford University Press, 1986).
 30. On 7 February 1759, for example, the Sick and Hurt Board recommended to the Admiralty that the use of the *Blenheim* be discontinued (and that of another hospital ship at Plymouth, once the new hospital there was ready), as at the royal hospitals 'Patients may be as effectually secured as on board an Hospital Ship, and their Cure sooner Compleated' if the sentries 'do their Duty'; ships 'at best afford but very indifferent conveniences for the Sick'. The National Archives [hereafter NA] ADM 98/7 (Sick and Wounded Board's Out-Letters to the Admiralty from 10 October 1757 to 1759), 374. See Baugh, *op. cit.* (note 25), 50–1, 180–4 and Crimmin, *op. cit.* (note 27) for good introductions to medical contracting.
 31. See, for example, K.J. Carpenter, *The History of Scurvy and Vitamin C* (Cambridge: Cambridge University Press, 1986), 57–61 on James Lind's belief, which he held until the early-1770s, that the moisture discouraging 'insensible' perspiration was scurvy's principal cause; and C. Lawrence, 'Disciplining Disease: Scurvy, the Navy, and Imperial Expansion

- 1750–1825’, in D. P. Miller and P. H. Reill (eds), *Visions of Empire: Voyages, Botany, and Representations of Nature* (Cambridge: Cambridge University Press, 1996), 80–106, on 86, which quotes John Pringle: the ‘corruption of the bilge water, is not only a main cause of sea scurvy, but often concurs in crowded ships, to raise a fever of the hospital or jayl kind’.
32. NMM ADM/E/11, not numbered, filed after (20.), 18 June 1745. Twelve years later, the Admiralty forwarded to the Commissioners, their interest in hospital planning now established, a proposal for an eighty-bed army hospital at Chatham. They approved of it, but suggested increasing the widths and heights of the wards, and that the building be enlarged to permit ‘the Cradles being placed separately’, two feet apart, instead of coupled. NA, ADM 98/6 (Sick and Wounded Board’s Out-Letters to the Admiralty from 30 October/1 November 1756–57 to 9 October 1757), 159–60 (26 January 1757).
 33. That ‘brute of a Shipwright’: Baugh, *op. cit.* (note 25), 48, quoting a remark from 1747. Ackworth was blocking changes in ship design that the Admiralty wanted, and failing to improve efficiency at the dockyards: *ibid.*, 89, 251–2. The Admiralty Secretary explained to the Commissioners on 18 June 1745 that ‘Their Lordships have directed Sr Jacob Ac[k]worth, who has been consulted in this Affair, and has Schemed a Plan for the Building, to meet you, when you shall apply to him, and Mr Jacobson, a Gentleman, who Voluntary was concerned in projecting the Plan for Building the Hospital for Foundlings, has likewise promised to give you his Company, whenever you shall send to him’: NMM ADM/E/11, not numbered, filed after (20.). Admittedly, it was a very unusual ‘Gentleman’-architect who designed big institutional buildings.
 34. As the Commissioners reported to the Admiralty on 17 June 1745, after Ackworth and Jacobsen met on their premises that day: NMM ADM/F/6 (Admiralty. In Letters from the Sick & Hurt Board, May–August 1745), not numbered.
 35. See the plan (Admiralty Library) annotated in early 1756, and reproduced by P.D.G. Pugh, ‘The Planning of Haslar’, *Journal of the Royal Naval Medical Service* 62 (1976), 103–20, on 115. The National Monuments Record (Swindon) file on the hospital, no. 100117, includes an excellent manuscript account (by Kathryn Morrison) of this complicated building in its present state.
 36. Lloyd and Coulter, *op. cit.* (note 21), 216. Tenon, *op. cit.* (note 20), 179–80 called it England’s biggest hospital, and J. Hunczovsky, in *Medicinis-chirurgische Beobachtungen auf seinen Reisen durch England und Frankreich besonders über die Spitäler* (Vienna: Rudolph Graffer, 1783), 49, its biggest brick construction.
 37. Hunczovsky, *op. cit.* (note 36), 50.

38. See the fast sketch that he made of the ground plan in 1787, reproduced in Tenon, *op. cit.* (note 20), facing 181.
39. Grosley, *op. cit.* (note 20), 2: 43, a precise translation from [P.-J. Grosley], *Londres. Ouvrage d'un François: Augmenté dans cette Édition des notes d'un Anglois*, 2nd edn, 3 vols (Neuchatel: Aux dépens de la Société Typographique, 1770), 2: 386; Tenon, *op. cit.* (note 20), 183–4.
40. NA, ADM 3/65 (Admiralty Board minute book, 19 November 1756–16 January 1758), 7 July 1757.
41. Most of the buildings survive. See the National Monument Record's file no. 100373, which, besides a manuscript report (by Kathryn Morrison) on the hospital's current condition, includes particularly informative aerial photographs.
42. Tenon, *op. cit.* (note 20), 182 mentions Bethlem and in his *Memoirs on Paris Hospitals*, Dora B. Weiner (ed.) ([Canton, MA]: Science History Publications, 1996; a translation of his *Mémoires sur les hôpitaux de Paris*, 1788), 28, the smallpox wards. Another useful description of the hospital is that of Richard Creke (appointed its Governor in 1795), transcribed in Lloyd and Coulter, *op. cit.* (note 21), 267–9.
43. Tenon, *op. cit.* (note 20), 154–5: 'Les maladies sont classées par salles de fiévreux, de fièvre de vaisseau qui ressemble à celle d'hôpital, de dysenterie, de scorbut, de phthisiques, de petite vérole, de galeux, du mal vénérien, de blessés.'
44. Stevenson, *op. cit.* (note 6), 162, 182; Tenon, *op. cit.* (note 42), 28.
45. Wellcome Library MS 5992 (Observations by Charles Middleton on Reports of Conditions at Haslar Hospital, Gosport [1780]), ff. 4r, 6v. On this inspection see Lloyd and Coulter, *op. cit.* (note 21), 213; their account of the hospitals is useful on the continuing administrative problems. On the 'Art von Ballspiel', Hunczovsky, *op. cit.* (note 36), 51; I have not been able to discover when, exactly, he visited England.
46. H. Colvin, *A Biographical Dictionary of British Architects, 1600–1840*, 3rd ed. (New Haven and London: Yale University Press, 1995), s.v. 'Rouchhead, Alexander'.
47. As Tenon, *op. cit.* (note 20), 154, pointed out. He would have preferred complete detachment for ventilation's sake, but reported that the medical staff were happy with the new arrangement.
48. '[N]otre Hôpital Royal de Plymouth, qu'on a trouvé par experience être fort bon, et peut-être de la meilleure construction de tous ceux que nous avons dans le Royaume.' Banks was writing (2 October 1788) to the French physicist Jean-Baptiste Le Roy: British Library Add. MS 8097, fo. 111. I owe this reference to L.S. Greenbaum, 'Tempest in the Academy: Jean-Baptiste Le Roy, the Paris Academy of Sciences and the Project of a New Hôtel-Dieu', *Archives Internationales d'Histoire des Sciences*, xxiv (1974), 122–40, on

139. For Plymouth and the French see also Stevenson, *op. cit.* (note 6), 191–3.
49. G. Blane, *Observations on the Diseases Incident to Seamen*, 3rd edn (London: Murray & Highley, 1799), 175–6, 178n.
50. M. Ignatieff, *A Just Measure of Pain: The Penitentiary in the Industrial Revolution 1750–1850* (London: Macmillan, 1978), 44–5.
51. J. Pringle, *Observations on the Diseases of the Army, in Camp and Garrison: In three Parts: With an Appendix, Containing Some Papers of Experiments, Read at Several Meetings of the Royal Society* (London: A. Millar, D. Wilson, and T. Payne, 1752), 334.
52. Quoted in J.H. Woodward, *To Do the Sick no Harm: A Study of the British Voluntary Hospital System to 1875* (London: Routledge & Kegan Paul, 1974), 98.
53. F. Nightingale, *Notes on Hospitals*, 3rd edn (London: Longman, Green, 1863), iii; Pringle, *op. cit.* (note 51), vii. Tobias Smollett quoted this sentence in his (anonymous) review of the *Observations: Monthly Review* vii (July 1752), 52–6, on 53. For the durability of the formulation, see Stevenson, *op. cit.* (note 6), 158.
54. Aikin, *op. cit.* (note 20), 9, 11; J. Jones, *Plain Concise Practical Remarks, on the Treatment of Wounds and Fractures; To which is added, an Appendix, on Camp and Military Hospitals; Principally designed, for the use of young Military and Naval Surgeons, in North-America* (1776), repr. edn (New York: Arno Press & The New York Times: 1971), 101–5; Tilton, *op. cit.* (note 1), 15.
55. Pringle, *op. cit.* (note 51), 252.
56. J. Pringle, *Observations on the Diseases of the Army*, 4th edn (London: A. Millar, D. Wilson, T. Durham, and T. Payne, 1764), 293–4; Stevenson, *op. cit.* (note 6), 169–70.
57. The ‘negligence, and laziness of the people in working them, and their diffidence of the utility of measures, which seem so simple and so trifling... made them fall very short of our expectations, whenever I attempted to enforce their use’: R. Brocklesby, *Oeconomical and Medical Observations... Tending to the Improvement of Military Hospitals* (London: T. Becket & P.A. De Hondt, 1764), 57.
58. ‘Es waren vormalz zu Lüftung der Zimmer Ventilators bestimmt; Dr. Lind fand aber, daß dieselben bey weiten der Bestimmung nicht so ein Genüge thun, als die, so viel möglich, offen gehaltenen Fenster, zumal da sie einander angebracht sind’: Hunczovsky, *op. cit.* (note 36), 52. According to Buchanan, *op. cit.* (note 24), 26, Lind had the sashes nailed open every spring.
59. Pringle, *op. cit.* (note 56), 293.
60. D. Monro, *An Account of the Diseases which were most frequent in the British Military Hospitals in Germany, from January 1761 to... March 1763: To which is added, An Essay on the Means of Preserving the Health of Soldiers, and*

From Palace to Hut

- Conducting Military Hospitals* (London: A. Millar, D. Wilson, & T. Durham, 1764), 364.
61. Brocklesby, *op. cit.* (note 57), 62–6, 72–3, 77.
 62. Tilton, *op. cit.* (note 1), 49 called his hut an experiment, but it was one forced by the hard winter. See Stevenson, *op. cit.* (note 6), 28–9, 163 for more extended discussions, from which I am borrowing here.
 63. She was actually writing about a more prosaic question: do patients in satisfactorily-ventilated hospitals catch cold? M. Vicinus and B. Nergaard (eds), *Ever Yours, Florence Nightingale: Selected Letters* (Cambridge: Harvard University Press, 1990), 210.
 64. Pringle, *op. cit.* (note 51), v.
 65. Brocklesby, *op. cit.* (note 57), 59; compare Lev. 14:44–45.
 66. O. Temkin, 'An Historical Analysis of the Concept of Infection' (1953), in *The Double Face of Janus and Other Essays in the History of Medicine* (Baltimore: Johns Hopkins University Press, 1977), 456–71: 468.
 67. L.M. Soo (ed.), *Wren's 'Tracts' on Architecture and Other Writings* (Cambridge: Cambridge University Press, 1998), 153.