

THE EXCREMENTAL CHAIN.

Most societies face a major sanitary problem. As the number and density of human beings increases, and likewise the number of the animals upon which they depend, so the excreta of both also increases. This excrement is difficult to dispose of. Normally it is allowed to lie about, or flushed into the water system. Micro-organisms then infect or re-infect human beings in various ways, directly by touch, through food or water contamination, or through flies and other vectors. It is probable that the majority of deaths in most pre-industrial societies have been caused as a result of contamination caused by the chain which passes through the human bowels. As we saw in the previous chapter dysentery, and typhoid were among the major diseases caused by faecal matter.

This problem is of marginal importance in lightly settled and mobile hunter-gatherer or pastoral societies, but as population density rises and people live close together in towns and cities, the problem grows exponentially. While such close and crowded living may well be a successful answer to the economic problems caused by the 'friction of space' and leads to economies of scale, better division of labour and so on, it is likely to lead to the Malthusian check of high mortality. For instance as an expert on epidemics points out, 'In the past, large cities were especially vulnerable to diarrhoeal epidemics, because it was difficult to dispose of large amounts of human waste.'¹

It may be that, like other animals, human beings have evolved some primitive instincts which were meant to cope with this danger of contamination and which worked reasonably well in fairly lightly populated populations. Humans appear to feel a widespread disgust about their excreta. This may be cultural, an aversion to those boundary substances which are neither in the body nor fully outside the body.² Or it may be some deep biological drive, seen in the way, for example, that cats and other animals cover up their faeces. Whatever the reason, it has meant that most human beings try to avoid the smell and sight of their own decomposing body matter. If this is the case, all things being equal, human beings will prefer not to have to defecate or urinate in a spot which they or others have consistently used.

Excrement in Japan.

In relation to Japan, we cannot understand what happened without taking account of geography. In this case, the background was the nature of the soil in Japan and the necessities of feeding the mounting population. The soil itself, was usually light and naturally infertile volcanic ash. As Kaempfer wrote in the 1690s, 'The soil of Japan, in itself, is for the major part, mountainous, rocky and barren' and only

¹ Jannetta, *Epidemics*, p.147

² Douglas, *Purity and Danger*

through the 'indefatigable care and industry of the natives' was it made 'fruitful enough to supply them with all manner of necessaries.'³ In the early nineteenth century Siebold echoed this view. 'The soil is naturally sterile, but the labour bestowed upon it, aided by judicious irrigation, and all the manure that can in any way be collected, conquers its natural defects, and is repaid by abundant harvests.'⁴ It was only heavy manuring that put life into the fields. Morse described how 'Without manure they do not cultivate; the soil is not rich in productive materials, as it is mostly of volcanic origin. A Japanese saying is, "A new field gives but a small crop."⁵ The lightness made it at first attractive and easy to work. Alcock was impressed. 'And what a soil it is! A rich dark friable earth, nearly black - light to handle, and without a stone or a pebble to be seen, which the lightest wooden plough just tipped with iron, turns up with ease. This is two or three feet deep, banked up from the paths.'⁶ On the other hand it contained almost no nutrient. He further noted that 'Another peculiarity in the physical character of the country has already been noticed, in the great prevalence of sand. The mountains were sandstone, and the rivers were sand, more than water. It could be traced everywhere in the soil, so much so that nothing but centuries of manuring of the most fertilizing kind, and an unlimited supply of water, with all the patient toil of a Japanese population, could ever have brought it into the crop-bearing state.'⁷

The problem was exacerbated by the fact that most of Japan was so mountainous that only a small part could be used for agriculture. As Chamberlain observed 'In this land of mountains, barely twelve per cent of the entire surface can be cultivated, and even the cultivable portion is not highly fertile by nature. It is made so by subsoil working, by minutely careful weeding, by manure judiciously and laboriously applied, by terracing, and by an elaborate method of irrigation.'⁸ The application of large amounts of manure was thus absolutely necessary. A cultivated area not much larger than a medium-sized English county, for instance Kent, was being used to support a population of some twenty-five million people by the end of the seventeenth century. The small amount of cultivated land and enormous amount of fertilizer that needed to be applied to it is described by King at the end of the nineteenth century. 'If we state in round numbers the total nitrogen, phosphorus and potassium thus far

³ Kaempfer, *History*, i, p.161

⁴ Siebold, *Manners*, p.231

⁵ Morse, i, p.24

⁶ Alcock, *Tycoon*, 1, p.296

⁷ Alcock, *Tycoon*, 1, p.76

⁸ Chamberlain, *Things*, p.19

enumerated which Japanese farmers apply or return annually to their 20 or 21 sq.miles of cultivated fields, the case stands 385,214 tons of nitrogen, 91,656 tons of phosphorus and 255,778 tons of potassium.⁹ Where was all this fertilizer to come from?

Here we encounter the second important feature, again related to the ecology of this mountainous island. This concerns the supply of animal manure, the major source of fertilizer in most agrarian civilizations. When we turn to the possibility of supplying the huge demand for fertilizer by using the excreta of domestic animals, cows, horses, sheep, pigs even chickens or pigeons, what immediately strikes us is the salient fact, described in Appendix xxx, that Japan has been a country largely without domestic animals for at least one thousand years.

The manure of those animals that did exist was carefully husbanded. Thunberg, for example, observed at the end of the eighteenth century that 'it is a very common spectacle to see old men and children following the horses that are used in travelling, with a shell (***Haliotis tuberculata***) fastened to the end of a stick, in order to collect the ordure from off the highways, which is carried home in a basket.'¹⁰ Morse echoed his observation nearly two centuries later. 'With the number of pack-horses and cattle that one sees on the road one is surprised at the absence of manure. There seems to be a class of men - at least they all are old men - whose duty it is to sweep up this material, not for the road's cleanliness, but for its value as dressing for the land.'¹¹ Yet the Japanese needed to turn elsewhere to solve the problem of how to fertilize their intensive grain cultivation. The results were impressive. As Thunberg observed 'There is no part of the world, where manure is gathered with greater care than it is here, insomuch that nothing that can be converted to this use is thrown away or lost.'¹²

Kaempfer wrote 'They are very dexterous and skillful in manuring their Ground, which they do in various ways, and with many different substances...'¹³ The Japanese used everything they could. 'In some fields they were ploughing in weeds and vegetables, apparently as manure.'¹⁴ Alcock added that

⁹ King, *Farmers*, p.213

¹⁰Thunberg, *Travels*, iv, 82

¹¹ Morse, i, p.153, see fig.127

¹²Thunberg, *Travels*, iv, 82

¹³ Kaempfer, *History*, 1, p.186

¹⁴ Alcock, *Tycoon*, 2, p.143

'horse manure and seaweed are both used, but the latter only suits a certain few crops.'¹⁵ The mountains were scoured for leaves and vegetation which were rotted down or dug into the soil. King describes the process. 'The first cutting of this hill herbage is mainly used on the rice fields as green manure, it being tramped into the mud between the rows...'¹⁶ Then 'The second and third cuttings of herbage from the **genya** lands in Japan are used for the preparation of compost applied on the dry-land fields in the fall or in the spring of the following season.'¹⁷ Such green vegetation and sea-weed could only supply a small part of the need.

With the long sea-coast, fish manure was another obvious way to try and meet the deficit. Fish were rotted down and spread on the fields. Griffis in the 1870s described how 'Millions of small fish lie drying along shore, to be used as manure.'¹⁸ Morse noted how 'a great many cargoes of fish manure are brought from Hakodate.'¹⁹ Hayami notes that 'Sardines caught and dried in the fishing villages of eastern Japan could be transported more than 500 kilometres (300 miles) to Osaka to be used as fertilizer for cotton cultivation in the surrounding villages.'²⁰ The extreme shortage of fertilizer as well as the sophisticated marketing and transport system is described by Totman. 'By the mid-eighteenth century, for example, fish caught off Tohoku were being brought to shore, unloaded, dried, baled, reloaded aboard coasting vessels, shipped south to Choshi, transferred to river boats, hauled up to the Tone to its south fork, sent down to Edo, punted over to riverbank warehouses, unloaded and stored, sold, reloaded on boats to go out into the Tama region, punted down the coast and upstream, unloaded, hauled overland to villages, and finally carried out to the fields and applied.'²¹

Yet fish and green manure combined could supply only a small part of what was required. We need therefore to turn to what King described as 'One of the most remarkable agricultural practices adopted by any civilized people' that is the 'centuries-long and well nigh universal conservation and utilization of

¹⁵ Alcock, *Tycoon*, 2, p.476

¹⁶ King, *Farmers*, p.209

¹⁷ King, *Farmers*, p.209

¹⁸ Griffis, *Mikado*, p.546

¹⁹ Morse, *Day*, i, p.24

²⁰ Hayami, *Transformation (xerox)*, 5

²¹ Totman, *Peasants*, p.466

all human waste in China, Korea and Japan, turning it to marvellous account in the maintenance of soil fertility and in the production of food.²²

Speaking of night soil, or human excrement, Morse reported that 'the immense value and importance of this material is so great to the Japanese farmer, who depends entirely upon it for the enrichment of his soil, that in the country personal conveniences for travellers are always arranged by the side of the road, in the shape of buckets or half-barrels sunk in the ground.'²³ This practice had been noticed at the end of the seventeenth century by Kaempfer: 'care is taken, that the filth of travellers be not lost, and there are in several places, near country people's houses or in their fields, houses of office built for them to do their needs.'²⁴ At the end of the eighteenth century Thunberg gave a particularly full account of the collecting of urine from passers by. 'Nay, even urine itself, which the Europeans so seldom turn to the advantage of their fields, is here carefully collected in large earthen pots, which are to be found sunk in the earth here and there in different parts, not only in the villages, but even beside the highways.'²⁵ Even within built-up areas methods were developed to collect the urine of passers-by. 'A privy, which is necessary for every house, is always built in the Japanese villages towards the street, and at the side of the mansion-house; it is open downwards, so that the passengers may discharge their waters from the outside into a large jar, which is sunk on the inside into the earth.'²⁶

In the villages, the precious commodity was carefully collected. In a community near Tokyo in the early twentieth century, 'Once a year, in fact, the terrace people were given what they called 'dung cakes'. A local farmer used regularly to bring along a cart and buy up all the night soil from the communal toilet; then, at the end of the year, he'd take them some of the special rice used for making rice cakes to thank them for the year's supply of 'dung'...'you can see 'business' has been good this year - there are plenty of dung cakes", we'd joke to each other.'²⁷ Likewise in the towns human excrement had a market value. I was told in Hiroshima in the renting of the poorer tenement houses, if three persons occupied a room

²² King, *Farmers*, p.193

²³ Morse, *Homes*, p.232

²⁴ Kaempfer, *History*, 2, p.293-4

²⁵ Thunberg, *Travels*, iv, 82

²⁶ Thunberg, *Travels*, iii, 144

²⁷ Silk, p.23

together the sewage paid the rent of one, and if five occupied the same room no rent was charged!.¹²⁸ We are told that 'Rent was adjusted on the basis of how many tenants there were and was raised if the number of occupants dropped.'¹²⁹ The excreta might even be sub-divided. 'The value of human wastes was so high that rights of ownership to its components were assigned to different parties. In Osaka, the rights to fecal matter from the occupants of a dwelling belonged to the owner of the building whereas the urine belonged to the tenants. Feces were considered more valuable and hence commanded a higher price.'¹³⁰ The commodity became more and more valuable, so that 'as the price of fish and other fertilizers rose, the value of night soil rose correspondingly, and vegetables were no longer sufficient to pay for it. By the early eighteenth century, with the increase in new paddies in the Osaka area, the price of fertilizer had jumped to the point that even night soil had to be purchased with silver.'¹³¹ The competition for night soil even led to open conflict. 'In the summer of 1724, two groups of villages from the Yamazaki and Takatsuki areas fought over the rights to collect night soil from various parts of the city.'¹³² Even in the 1930s 'every scrap of human manure is used to-day...The school and village office rent out the right to collect their night-soil.'¹³³

The extreme hoarding of human excreta is delightfully illustrated in the oral history collected from a late nineteenth century woman. (check date xxx). She described how 'When the mother-in-law stepped out of the house, she did not go beyond the village boundary, because she said, she didn't want to waste any human manure. Whenever the young wife left the house, her mother-in-law would tell her, "If you feel like relieving yourself while you're out, be sure to run into our field".'¹³⁴ Dore in the 1950s remembered past days when people 'told stories about stingy guests who would hurry home when they felt their sphincters tightening so as not to give away valuable fertilizer.'¹³⁵

¹²⁸ Morse, Homes, p.232

¹²⁹Hanley, Sanitation (xerox), 9

¹³⁰4 ley, Sanitation (xerox), 9

¹³¹Hanley, Sanitation (xerox), 9

¹³²Hanley, Sanitation (xerox), 10

¹³³ Embree, Suyu Mura, p.35

¹³⁴ Hane, p.88

¹³⁵ Dore, Shinohata, p.74

The immense amount of human manure applied to the fields is analysed by King. 'Japan produced, in 1908, and applied to her fields, 23,850,295 tons of human manure; 22,812,787 tons of compost; and she imported 753,074 tons of commercial fertilizers, 7,000 of which were phosphates in one form or another. In addition to these she must have applied not less than 1,404,000 tons of fuel ashes and 10,184,500 tons of green manure products grown on her hill and weed lands, and all of these applied to less than 14,000,000 acres of cultivated field s...' ³⁶ The human manure alone he calculated as 1.75 tons per acre of cultivated land. ³⁷ Calculating '...the average amount of excreta per day for the adult at 40 ounces, the average annual production per million of adult population is 5,794,300 pounds of nitrogen; 1,825,000 pounds of potassium, and 775,600 pounds of phosphorus carried in 456,250 tons of excreta. ³⁸ Somewhat lower figures of 1.5lb (24oz) per person per day were suggested for Europe by Boussingault, as quoted by Chadwick, but Boussingault was also impressed by what he calculated as the 16.41 lbs of nitrogen per person per year produced, enough to 'Yield the nitrogen of 800lbs' of good grain. ³⁹ Particularly important was the urine, which constituted some 5/6th of the weight and which is 'more husbanded by the Chinese than night soil...' ⁴⁰ Thus the Japanese, King worked out, 'save for plant feeding more than a ton of phosphorus (2,712lbs) and more than two tons of potassium (4,488lbs) per day for each million of adult population. ⁴¹

The collecting, moving, disinfecting and distributing of this immense amount of human night soil, roughly half a ton per person per year in 1908, was an operation which could have caused immense health problems. This was a danger which western visitors, particularly those who had witnessed disease in India, assumed to be present. Rudyard Kipling on his visit to Japan wrote 'Only one drawback occurred to the Professor and myself at the same time. Crops don't grow to the full limit of the seed on heavily worked ground dotted with villages except at a price. "Cholera", said I, watching a stretch of

³⁶ King, *Farmers*, p.297

³⁷ *ibid*, p.194

³⁸ King, *Farmers*, p.194

³⁹ Chadwick, *Report*, 123; recent figures suggest some 4 oz. of faeces and 50 oz. per day of urine per adult per day. (Roberts, *Hygiene*, 459)

⁴⁰ *ibid*

⁴¹ King, *Farmers*, p.74

well-sweeps. "Cholera", said the Professor. "Must be, y'know. It's all sewage irrigation".⁴² There were other dangers. E.L. Jones notes that when agriculture shifted south 'Faeces discharged into water made China the world reservoir of lung, liver and intestinal flukes and the Oriental schistosome...Human excreta were used as a fertilizer, and soil-transmitted helminth infestation was an occupational hazard for the farmer.' 'The immense infestation of liver parasites and worms,' he thinks, was 'the penalty for a dense population operating irrigation agriculture in a warm climate, with inadequate sources of fertilizer.'⁴³ Yet the dangers Kipling and Jones allude to only refer to the last link in the chain. Huge cities and densely populated towns and villages where the millions of tons of night soil was being collected, moved and stored could have provided ideal conditions for flies and the contamination of water and food.

The first stage is the collecting of human excreta. As argued earlier, there is likely to be some natural resistance to the smell of excreta and the idea of depositing it in a confined space day after day. Perhaps this partly explains the odd contrast between the etiquette of eating and defecating as noted by Morse. 'The act of ingestion has been accompanied by a certain rude etiquette and with the aid of simple dishes often decorative, while the action of egestion still places the larger portion of the human race on a level with his simian relatives.'⁴⁴ There appear to be a number of features of Japanese culture which helped overcome this obstacle. One aspect is the attitude towards the body, towards natural functions, towards bodily control, towards privacy and decency. These were and are very different in Japan from those in Western Europe as we have seen in relation to clothing and bathing. In the nineteenth century western travellers noted for instance that among the lower classes 'an answer to the call of nature is performed...upon the roadside, even in the presence of ladies, entirely oblivious of the indecency of the act itself or consequent exposure of the person.'⁴⁵ Or as Frederic described for the medieval period 'As for the needs of nature, they were attended to anywhere at all, at the corner of a street or in the country, wherever one happened to be. For this purpose people put on **takaashida**, a kind of very high wooden clog, to prevent their clothing trailing on the ground.'⁴⁶

In fact, defecation and urination were not indecent or embarrassing. Lock explains, that a child 'gradually becomes aware that its body processes and everything that enters and leaves its body are

⁴²Thames (ed.), *Encounters*, p.89

⁴³ Jones, *Miracle*, p.6-7

⁴⁴Morse, *Latrines (xerox)*, 174

⁴⁵ Gardiner, *Japan*, p.41

⁴⁶ Frederic, *Daily Life*, p.87

being carefully monitored by its mother, and it is trained to take over these functions from her.⁴⁷ This has several consequences. For instance, 'This regular monitoring of the body results in a great sensitivity to bodily functions and an ability on the part of most people to discuss their own bodies in a rather objective way without embarrassment.'⁴⁸ Combined with this openness and lack of embarrassment, there is also firm discipline and control. As Gorer described the situation, 'In the life of Japanese children, the most consistent and most severe aspect is...training in control of the sphincter'. After four months or so, 'the child is held out over the balcony or road at frequent intervals, either when it cries, or when its guardian considers the time is ripe; any lapse from cleanliness is punished with severe scolding, the mother's voice expressing horror and disgust, and often also by shaking and other physical punishment.' This training is 'meant to be complete by the time the child can toddle on to the balcony and all informants agree that this ideal is obtained.'⁴⁹

If this is the widespread pattern, it is not difficult to see how severe control was combined with an attitude towards the act itself which sees it as 'natural' and not indecent. Historically, the negative attitude to the faeces themselves may have been minimized by the fact that as almost pure vegetarians, excrement smelt far less than the excreta of meat-eaters. Furthermore, the Japanese seem to have been brought up in a way which meant that they did not find the smell offensive. This is suggested by Beardsley and co. in the 1950s, when they wrote that the 'repugnance to fecal odors' was something new in Japan' being learned more in the schools than at home.⁵⁰ Or again, another anthropologist describes how 'Strong odors invariably announce that nightsoil is being handled. However, no one particularly minds this and, in fact, a farmer of the old school is said to find this odour pleasantly suggestive of the earth's fruitfulness.'⁵¹

The end result of control, absence of embarrassment and a great concern with cleanliness led to the development of probably the earliest, most sanitary, and elegant toilet facilities in the world. These were aesthetically and functionally designed to capture from each individual solid and liquid wastes measuring more than half a ton a year and ensuring that they were preserved in a state that caused minimal risk to health or beauty. In 1696 Kaempfer noted the great cleanliness of Japanese toilets. Commenting on the

⁴⁷ Lock, *Medicine*, p.74

⁴⁸ Lock, *Medicine*, p.74

⁴⁹ Gorer, *Themes (xerox)*, p.111

⁵⁰ Beardsley, p.88

⁵¹Cornell, *Two Villages*, 130; for the strength of the smell to visitors, see Thunberg, *Travels*, iii, 144

inns which he visited he wrote: 'The house of office is built on one side of the back part of the house, and hath two doors to go in. Going in you find at all times, a couple of new small mats, made either of straw or Spanish broom, lying ready, for the use of those persons, who do not care to touch the ground with their bare feet, although it be kept neat and clean to admiration, being always cover'd with mats. You let drop what you need, sitting after the Asiatic fashion, through a hole cut in the floor. The trough underneath is fill'd with light chaff, wherein the filth loses itself instantly. Upon the arrival of people of quality, the board, which is opposite to your face, sitting in this necessary posture, is cover'd with a clean sheet of paper, as also are the bolts of the two doors or any other part they are likely to lay hold of. Not far from the little house stands a bason fill'd with water, to wash your hands after this business is over. This is commonly an oblong rough stone, the upper part whereof is curiously cut out, into the form of a bason. A new pail of bambous hangs near it, and is cover'd with a neat fir, or cypress board, to which they put a new handle every time it hath been us'd, to wit a fresh stick of the bambou cane, it being a very clean sort of a wood, and in a manner naturally varnish'd.'⁵²

(APPENDIX. The Japanese toilet. a-toilet)

Morse alluded to the fact that the toilet had 'a convenient access to it from the outside'. This takes us to one of the main difficulties which can cause immense sanitary and hence health problems, namely the emptying and moving of excreta away from the privy to its final destination. Morse noted the absence of a sewage system in Japan and its advantages. When comparing Japanese and American cities in the 1870s he noted that 'the secret of sewage disposal has been effectually solved by the Japanese for centuries, so that nothing goes to waste.' As a result that 'class of diseases which scourge our communities as a result of our ineffectual efforts in disposing of sewage, the Japanese happily know but little. In that country there are no deep vaults with long accumulations contaminating the ground, or underground pipes conducting sewage to shallow bays and inlets, there to fester and vitiate the air and spread sickness and death.'⁵³ Thus 'those diseases which at home are attributed to bad drainage, imperfect closets, and the like seem to be unknown or rare, and this freedom from such complaints is probably due to the fact that all excrementious matter is carried out of the city by men who utilize it for their farms or rice-fields.'⁵⁴ 'With us the sewage is allowed to flow into our coves and harbors, polluting the water and killing all aquatic life; and the stench arising from the decomposition and filth are swept over the community to the misery of all. In Japan this material is scrupulously saved and goes to enrich the soil.'⁵⁵ Elsewhere he wrote that 'The result of the transference of this material into the country leaves

⁵² Kaempfer, 2, p.323-4

⁵³ Morse, Homes, p.233

⁵⁴ Morse, Homes, p.202

⁵⁵ Jannetta, p.202; Morse, i, p.23-4

the shores of a city absolutely pure. No malarious flats nor noisome odors, arising from littoral areas, curse the inhabitants, as with us.⁵⁶

The toilets were emptied 'every few days' according to Morse, though it was unlucky to do so 'on days with the 10, as 10th, 20th, 30th' when 'the latrine must not be cleaned.'⁵⁷ The toilets were emptied in Tokyo, for instance 'by hundreds of men who have their regular routes. The buckets are suspended on carrying-sticks and the weight of these full buckets would tax a giant.'⁵⁸ In this city, the excrement of nearly a million inhabitants 'is carried off daily to the farms outside, the vessels in which it is conveyed being long cylindrical buckets borne by men and horses.'⁵⁹ Earlier much of the transport was on the human back, but horses and then wheels began to be used. Alcock noted that 'The occasional passage of a train of porters carrying open pails of liquid manure from the town to the fields, or a string of horses laden with the same precious but 'perilous stuff' may, indeed, be objected to. But the conical tubs on the horses are carefully covered over, and form, indeed, a great improvement on the open pails.'⁶⁰

Some forty years later the variety of methods is well described by King. He noted how 'During our ride to Akashi on the early morning train we passed long processions of carts drawn by cattle, horses or by men, moving along the country road which paralleled the railway, all loaded with the waste of the city of Kobe, going to its destination in the fields, some of it a distance of twelve miles, where it was sold at from 54 cents to \$1.63 per ton.'⁶¹ He described the night soil carts. 'Such carts are even more frequently drawn by men than by cattle or horses, and tightly covered casks supported on saddles are borne on the backs of both cattle and horses, while men carry pails long distances on their shoulders, using the carrying pole.'⁶² By this time, certainly, the tubs were closed. 'Here, too, the night soil of the city was being removed in closed receptacles on the shoulders of men, on the backs of horses and cattle

⁵⁶Morse, *Latrines* (xerox), 172

⁵⁷ Morse, *ii*, p.311

⁵⁸ *ibid*

⁵⁹ Morse, *Homes*, p.232

⁶⁰ Alcock, *Tycoon*, 1, p.120

⁶¹ King, *Farmers*, p.397

⁶² King, *Farmers*, p.197

and on carts drawn by either.⁶³ In other cities, and in earlier centuries, boats were used, as in Osaka.⁶⁴ All this was offensive to foreign residents. Mrs. Geoffrey reported that "'violets" was our password when one of these equipages was spied approaching, and was the signal for every one to bury his nose in a handkerchief.⁶⁵ But the smell, as we have earlier seen and according to Chamberlain, 'causes no distress to native noses.'⁶⁶

The destination and further treatment of the night soil is equally important, for having minimized contamination in the toilet and journey, all the good would have been undone if the half million tons a year coming out of Tokyo, for instance, was not carefully stored and applied, 'This stuff is often transported miles into the countryside where it is allowed to remain in open half oil-barrels for a time and then is distributed to the rice-fields by means of long-handled wooden dippers.' There it joined the waste from the village itself. The widespread presence of mini-reservoirs where the mixture of urine and faeces were allowed to decompose was noted early on by Kaempfer. 'Old shoes of horses and men, which are thrown away as useless, are gather'd in the same houses, and burnt to ashes, along with the filth, for common dung, which they manure all their fields withal. Provisions of this nasty composition are kept in large tubs, or tuns, which are buried even with the ground, in their villages and fields, and being not cover'd, afford full as ungrateful and putrid a smell of radishes (which is the common food of country people) to tender noses, as the neatness and beauty of the road is agreeable to the eyes.'⁶⁷ By the twentieth century these 'tubs, or tuns' had become 'cement-lined pits'.⁶⁸

This process was essential in two ways. Firstly, it greatly added to the agricultural value of the mixture. As King wrote 'The wastes of the body, of fuel and of fabric worn beyond other use are taken back to the field; before doing so they are housed against waste from weather, compounded with intelligence and forethought and patiently laboured with through one, three or even six months, to bring them into the most efficient form to serve as manure for the soil or as feed for the crop.'⁶⁹ The second, perhaps

⁶³ King, *Farmers*, p.42

⁶⁴Hanley, *Sanitation (xerox)*, 9

⁶⁵ Geoffrey, *Immigrant*, p.45

⁶⁶ Chamberlain, *Things*, p.20

⁶⁷ Kaempfer, *History*, 2, p.294

⁶⁸ King, *Farmers*, p.199

⁶⁹ King, *Farmers*, p.137

unintended, consequence, was to kill almost all the harmful micro-organisms in the night soil. Writing about the dangers of flies in night soil, Roberts described how 'By close-packing the manure and relying on the heat of fermentation to destroy the larvae (220o F kills in three minutes). The heat of fermentation may usefully conserve by covering the manure with tarpaulings, or by collecting the manure, when fresh and therefore most dangerous, in concrete receptacles.'⁷⁰ Furthermore, by keeping the night-soil in containers, the chain of fly reproduction is broken, for it is necessary for the larvae, if they have survived, to heave the excrement at a later stage in order to survive. In a tub or barrel, they would not be able to do so and could not hatch. (see XXX) As Dore wrote much later 'Gone are the days when one ladled out the deep toilet bowls into buckets and emptied them in cisterns dotted about the fields for the manure to mature into a harmless mixture ready to be put on the fields.'⁷¹ By the end of some months kept moist in a tub, the mixture would have kept the maximum amount of nitrogen and other useful elements, which are lost in drying, and would have been almost sterile. As Thunberg noted at the end of the eighteenth century, the Japanese farmer, 'does not carry out his manure either in winter or in summer into his fallow fields, to be dried up there by the scorching heat of the sun, and to have its nutritive qualities weakened by the evaporation of the volatile salts and of its oily particles.'⁷²

The sterility would have been further ensured when the excreta was spread on the land. As Dubos writes 'Throughout most of human history, domestic and industrial sewage was spread over the land. This practice took advantage of the fact that soil possesses certain built-in mechanisms - physical, chemical, and microbial - capable of destroying most substances and microorganisms, including those which might be dangerous for man.'⁷³ Or as King noted in 1911, 'recent bacterial work has shown that faecal matter and house refuse are best destroyed by returning them to clean soil, where natural purification takes place.'⁷⁴ The exact quantities applied and the depth of burying are important. Roberts describes the ideal practice of 'trenching' of night soil. 'A suitable area of loamy soil should be selected, the excreta placed in trenches about 9 inches deep, and covered with 3 or 4 inches of earth. Such a trench, 8 feet long and 7 inches wide, will take one day's excreta of 100 persons. Under suitable

⁷⁰Roberts, Hygiene, 240

⁷¹ Dore, Shinohata, p.74

⁷²Thunberg, Travels, iv, 82/3

⁷³ Dubos, Adapting, p.198

⁷⁴ King, Farmers, p.199

conditions the same path of ground may be used over and over again at intervals of a few months.⁷⁵ The Japanese methods improved on this, and we may briefly look at the careful and systematic way in which roughly 1.75 tons of night soil was applied to each acre.

There were several methods used to prepare it for use. It might be worked with water and then dried. Sometimes 'the material is worked and reworked, with more water added if necessary, until it becomes a rich complete fertilizer, allowed to become dry and then finely pulverized.'⁷⁶ More often it seems to have been spread in liquid form, where it would penetrate with maximum effect to the roots of the plant or into the prepared soil as needed. If it has not been well kept and had dried out, it needed to be made wet again. Isabella Bird noted with disgust how there were 'much-decayed manure heaps, and the women were engaged in breaking them up and treading them into pulp with their bare feet.'⁷⁷ Thunberg observed with similar revulsion 'the disgusting trouble of mixing up manure of various sorts, the excrements both of man and beast, with water and urine, together with every kind of refuse from the kitchen, till it becomes a perfect hodge-podge.'⁷⁸ Morse described how 'In some of the plots men are at work breaking up the soil, in others distributing from buckets the liquid manure.'⁷⁹ Alcock wrote thus. 'Human manure is given in a liquid state, during the younger stages of the growing crops...'⁸⁰ Alcock cites Thunberg's description, sixty years earlier. 'This collection of manure of every kind of urine and offals, which they had prepared at home, quite thick and fluid, they now carried in two pails on their shoulders to their lands, and there with a scoop poured it out near the roots of the green corn, the blades of which were six inches long. This I was told was done twice each time they sowed.'⁸¹ He saw the great advantage of this, for the young plant 'receives the whole benefit of it, at the same time that the liquor penetrates immediately to the root.'⁸² When the corn grew another six inches, 'the farmer has dug

⁷⁵Roberts, *Hygiene*, 460

⁷⁶ King, *Farmers*, p.251

⁷⁷ Bird, *Tracks*, p.91

⁷⁸Thunberg, *Travels*, iv, 83

⁷⁹ Morse, i, p.9-10

⁸⁰ Alcock, *Tycoon*, 2, p.476

⁸¹Thunberg, *Travels*, iii, 213

⁸²*Travels*, iv, 83

up, as it were, these small trenches, and very carefully put earth about the roots, which the corn has both received manure and been watered.⁸³

It is worth stressing the value of storing night soil in liquid form and then distributing it thus. Liebig, the greatest living authority on agricultural chemistry, states that night-soil loses in drying half its valuable products, that is, half its "nitrogen", for the ammonia escapes into the atmosphere. By irrigation, by the diffusion and conveyance of the manure to the plant in the medium of water the escape of the valuable substance as a noxious and injurious gas is diminished.⁸⁴ Furthermore, '...it is at the same time stated, the process of applying manure by irrigation, that is, separated and diluted with water, is considered to be productive of less deleterious gas, of less injurious effects, than by spreading it over fields in a solid form, and allowing it to remain until it is decomposed and separated by the atmosphere and conveyed into the soil by rain.⁸⁵ Thus applying the liquid night soil was beneficial both agriculturally and probably in terms of health.

The immense labour of spreading the liquid manure was reduced considerably by the use of a simple technique. 'When they wish to manure a field, they make a tree do the duty of one man and very much assist and economize the labour of the other by passing a rope through the handle of the pail close to the depot of the manure, one end of which is secured to the tree and the other is held by a labourer to enable him to swing the contents over a wide area. In other cases he is supplied with a large ladle, at the end of a ten feet handle, which gives an equally wide sweep, and with little labour.⁸⁶ This last technique also allowed the liquid to be applied to the exact point where it was needed. A more recent account describes how in some areas 'Unlike the coastal plain to the south there are few cisterns for storing and curing nightsoil.' Instead, the nightsoil 'is removed from a tank beneath the toilet in each homestead and taken directly to the field in wooden buckets suspended from carrying poles. In the fields it is dipped from the buckets by means of a long-handled wooden dipper and dripped along the rows of plants.'⁸⁷ This method was particularly effective in two ways. As King noted when comparing the methods of American and Asian agriculture, 'The difference is not so much in activity of muscle as it is in alertness and efficiency of the grey matter of the brain. He sees and treats each plant individually, he loosens the

⁸³Thunberg, *Travels*, iv, 87

⁸⁴ Chadwick, *Report*, p.122

⁸⁵ Chadwick, *Report*, p.121

⁸⁶ Alcock, *Tycoon*, 1, p.297-98

⁸⁷Cornell, *Two Japanese*, 130; this sounds like the method described by Thunberg, *Travels*, iv, 83

ground so that his liquid manure drops immediately beneath the surface within reach of the active roots.⁸⁸

It may also have minimized health risk as the earth and manure were quickly mixed. The combination of methods may also account for a diminution of the smell, even when compared with China. Alcock noted with surprise, 'After I had resided some time in Japan, I found both the disagreeables and advantages required to be restated, with certain modifications. Except in spring, during the months of March and April, there is little in the manuring to complain of. How this is managed I cannot tell, for all exercise in the country in China, throughout the year, had this terrible drawback attached to it.'⁸⁹ Care also seems to have been taken to keep the pails in which excrement was carried to the fields as clean as possible. Morse noted that 'The cleanliness of the Japanese is amazing...The wooden buckets in which the sewage is carried to the fields are white and clean as our milk pails.'⁹⁰ Some felt that the cleaning of these buckets was a danger. 'To make matters worse, the farmers often washed their night soil buckets in the same streams.'⁹¹ But, as we have seen, the drinking practices helped to minimize the dangers here. The one great disadvantage of the whole operation was allegedly the taste of the fruit and vegetables; 'either from the too great supply of manure to the soil, or other causes - perhaps perpetuating the same seeds and plants without change - all their vegetables are either rank or tasteless; and their fruit is no better.'⁹² On the other hand, it added to the productivity and substantially cut down a normally very arduous part of grain cultivation, namely weeding. Alcock noted that 'The manure chiefly in use, dung and night soil, no doubt tends very materially to abate the growth of weeds; but this does not detract from the skill, industry, and diligence which the Japanese agriculturist brings to bear upon his land.'⁹³

Conclusion

Excrement, human and animal, is one of the major links in the chain of digestive tract disease. Through the absence of animals and the extraordinary pains which they took to carry away all human

⁸⁸ King, *Farmers*, p.203

⁸⁹ Alcock, *Tycoon*, 1, p.70

⁹⁰ Morse, *i*, p.61

⁹¹ Hane, p.44

⁹² Alcock, *Tycoon*, 1, p.70

⁹³ Alcock, *Tycoon*, 1, p.319

manure, sterilize it, and then bury it at the roots of the plants, the Japanese achieved a level of sanitation unrivalled by another major nation until the twentieth century.

Excrement in England.

A similar problem concerning excrement was meanwhile facing Western Europe. There was the same contradiction between economic efficiency and mounting population on the one hand, and the 'externalities' of excrement on the other. Europe's solution to this problem was very different, for the relation between men and animals was totally the opposite to Japan. North-western Europe through the centuries was based on mixed arable and pastoral farming and the number of domestic animals per head of population was higher than in any other large settled population. Without these animals, the economic system would have collapsed. Yet they alter all the dynamics of the situation.

West European agriculture depended very heavily on manure. This fertilizer took a number of forms, but its central constituent was animal dung. Grain production produced straw, which could be used to feed large numbers of cows and oxen, whose manure could then be re-cycled, and the grain produced was ideal for men as well as pigs and chickens. There were also large areas of pastoral upland where cows and sheep produced considerable amounts of manure. To what extent was there still a need for night soil as a fertilizer?

It would appear from general surveys that in the long period between the twelfth and eighteenth centuries, night soil was not used very much in Western Europe, with one notable exception. The general position concerning animal and human manure is summarized by Braudel. He wrote that 'the principal source of manure remained livestock - never human beings, as in the towns and countryside of the Far East...' The partial exception he noted was that 'in the West' urban refuse was used 'around certain towns, such as Valencia in Spain or some Flemish cities.'⁹⁴

It is worth looking at the Flemish case in more detail. This partial exception is described by van Bath. He notes how in Flanders 'Already in the Middle Ages they had begun to buy night soil (human excrement) and city garbage.'⁹⁵ In a journey through the Netherlands in 1821 'von Grouner describes the great stores of manure on the Schelde...whence the excrement from Dutch towns was transported by barge. Specifically Flemish are all sorts of implements for carrying, mixing and spreading manure. Foreign travellers were always astonished at the care with which the Flemish collected manure.'⁹⁶ A description of the system in the 'Outlines of Flemish Husbandry' was quoted by Chadwick. 'The

⁹⁴ Braudel, *Capitalism*, p.77

⁹⁵ Braudel, *Capitalism*, p.77

⁹⁶ *ibid*, 256-7

business of collecting urine and night-soil employs an immense number of persons, who deposit tubs in every house in the cities for the reception of the urine of the inmates, which vessels are removed daily with as much care as our farmers remove their honey from the hives.⁹⁷

The situation in the very crowded and urbanized Netherlands, with a dense population pressing on a limited agricultural base and a relative scarcity of large domestic animals, reminds one very much of Japan. There was a charmed circularity about the relationship between urban consumption and sub- and ex-urban horticulture, with the manure produced from all that stuffing going to fertilize even greater yield ratios in the fields, that in turn fed larger urban populations, which in turn...⁹⁸ The mixture of the economic and sanitary value of the mechanisms is similar. As van Bath notices 'Obviously this was also beneficial to urban hygiene, especially in comparison with other lands, where little was done to keep the towns clean.' Indeed, the city elders began to realize that they could deal with both the problem of hygiene and also raise money to clear the streets - even if the farmers did not want the night soil. The value of the "public night soil and street refuse" was acknowledged by the Groningen magistrates, who obliged the settlers in the peat-marsh colonies...to manure the ploughed peat-marsh with city refuse. These edicts date from 1628, 1636 and 1651.⁹⁹ 'The Flemish estimate the ejectamenta of one individual, in money value, at between twenty and forty shillings; and have, from a remote period, carefully collected and applied them.'¹⁰⁰ Hence it has often been noted that the Dutch and Flemish are among the cleanest of countries - their towns, villages and houses spick and span.¹⁰¹

The Flemish/Dutch case indicates that there was no reason in principle why night soil should not have been used anywhere in Christian Europe. Yet its use was very patchy. We have seen that it was used in Valencia. It was also 'most valuable manure, which was quite indispensable to the agriculture around Paris, and consequently to Paris itself.'¹⁰² It was claimed that 'The French, and Prussians, and the Germans' all used night soil to a certain extent in the nineteenth century.¹⁰³ There is some evidence of its

⁹⁷ Chadwick, Report, p.123

⁹⁸ Schama, Embarrassment, p.170

⁹⁹ Van Bath, Agriculture, p.257

¹⁰⁰ Rural Cyclopedia, p.347

¹⁰¹ Schama, Embarrassment, p.??

¹⁰² Chadwick, Report, p.133

¹⁰³ Rural Cyclopedia, p.347

use during the nineteenth century in Scotland. For example, in parts of Glasgow 'There were no privies or drains there, and the dung heaps received all filth which the swarm of wretched inhabitants could give; and we learned that a considerable part of the rent of the house was paid by the produce of the dung heaps.'¹⁰⁴ Yet the use seems to have been relatively small when we compare it to that of China or Japan. For example, a survey of writers on agricultural methods in Europe through the centuries only provides three references to the use of night soil. Two are Roman authors, and one a sixteenth century German author whose work is 'purely classical'.¹⁰⁵ We can thus see that while night soil **could** have been used, it was hardly employed except near a few big cities.

Turning to the English case, we might not have expected much use in smaller towns and villages, but from the middle of the sixteenth century London was emerging as one of the major cities in the world. By 1700 it was, with a population of roughly xxx, the largest city in Europe. The demand this created on local agriculture has been documented.¹⁰⁶ It would appear to be in the position of the Flemish and Dutch cities or Paris and hence we would have expected a widespread use of night soil.

(APPENDIX. The non-use of night-soil in England. a-night)

Whatever the jumble of reasons, 'domestic arrangements', over-abundance of animal manure, some instinctive aversion, the outcome is clear. With some minor exceptions, the use of a little 'privy soil' here and there for vegetables, some use of city refuse in medieval London, and no doubt some other instances, England was at the opposite extreme to Japan. Whereas Japan was the case where night soil was most highly prized, in England it could not be given away.

This created an immense problem. If each person produced some 40oz of excrementa per day, then a city like London was producing many tons a day. It was a growing threat as the cities expanded. It was exacerbated by the vast amounts of horse manure. The solution to this problem was to be a major contribution by the English to world civilization.

As we have seen, there are three major stages in the disposal of human excrement. There is the collection of the material, the transfer to the place where it is to be used or dispersed, and its final application or transformation. One of the most difficult tasks is to create a system which will capture the excreta efficiently from human beings, the toilet, latrine or privy. In the majority of societies, people tend

¹⁰⁴ Chadwick, Report, p.98

¹⁰⁵ Fussell, Classical Tradition

¹⁰⁶ Fisher, London's Growth

to go out into the fields and woods. The idea of excreting within an enclosed space, whether a room or even a separated building, is rather unusual, though we have seen that the Japanese early developed the idea. It would appear that the notion of a 'private' room or 'privy' was also an early feature in England. 'Among the lower orders there were some private latrines, as we know from housing ordinances of 1189, requiring that garderobe pits, if not walled, must be at least five and a half feet from the party line; if walled, two and half feet.'¹⁰⁷ Two centuries later, 'In a contract dated 1370 for the building of 18 shops in London, the mason was to make "ten stone pits for **prevez**, of which pits eight shall be double (i.e. serve two houses) and each in depth ten feet and in length ten feet and in breadth eleven feet.'¹⁰⁸ Two centuries later, a contract for some house repairs in 1450 includes a price for the 'takeying owte of a serteyne of dounge owte of a privey and for to bery ye dounge in ye same pyt (5s 6d).'¹⁰⁹

There are references to privies in Chaucer's late fourteenth century poems and Furnivall¹¹⁰ gives a good idea of the amount of care and attention devoted to the subject. There is a description of a Lord's toilet, how it is to be kept, the rags, water, seat and so on. This suggests that the English already deviated from the Continental posture in defecation - sitting rather than squatting. It also suggests that rags were used to wipe the bottom - less satisfactory than the Japanese solution of wood or paper perhaps, but an improvement on many materials. The early history of the materials used for wiping the anus is somewhat obscure. Pudsey writes 'It is a subject I prefer not to explore in detail, except to recall that civilized romans used perfumed wool and sometimes sponges, that medieval laity were known to use curved sticks and bunches of hay, that ecclesiastics, whose smallest rooms were often well found and often communal, seemed to have favoured the shreds and tatters of their own discarded habits.'¹¹¹

Less obscure is the matter of medieval public latrines, which has been illuminated in an excellent article by Sabine. He gives considerable evidence of both the widespread use and existence of public latrines in London from at least the thirteenth century. He asks, 'If, then, citizens so commonly used the public latrines, how many such conveniences were there? Writers upon the subject usually mention only three: one on Temple Bridge (or pier) south of Fleet Street, one at Queenhithe, and one on London Bridge.'¹¹²

¹⁰⁷ Wright, Decent, p.50

¹⁰⁸Wright, Decent, 50; cf Pounds, Culture, 162

¹⁰⁹ Wright, Decent, p.52

¹¹⁰ Furnivall, Meals, p.64

¹¹¹Pudney, Smallest, 122

¹¹²Sabine, Latrines (xerox), 307

In fact, a little research revealed many more. 'Certainty has, therefore, been established for the existence of at least thirteen mediaeval London public latrines. The fact, however, that a knowledge of even this number has been successfully gleaned from mere incidental documentary evidence clearly indicates that there must have been many more such public conveniences.'¹¹³ London Bridge alone seems to have had several latrines. 'London Bridge, however, had not merely one common latrine, as has been commonly assumed, but several "necessary houses or wardrobes" for the convenience both of the tenants of the houses built on the bridge and of other people resorting to the place.' They were, 'of no inconsiderable size and importance.'¹¹⁴ It appears that these public latrines 'seem to have been not merely for the relief of the floating business population, but rather primarily for the benefit of those householders and tenants who had access to no private latrines.'¹¹⁵

The evidence on the 'house of office' becomes more voluminous from the sixteenth century and we appear to be in a world where there is a widespread use of privies. In the early sixteenth century Andrew Boorde gave a detailed description of the arrangements for the privy - where it was to be built, how used and so on.¹¹⁶ People should get into the regular habit of using it first thing in the morning etc.¹¹⁷ Harrison in the 1560s noted that in houses lately built, there were 'houses of office further distant from their lodgings.'¹¹⁸ Lemnius, visiting England at the same time noted the nosegays and fragrant flowers in English 'chambers and privy rooms.'¹¹⁹ In the seventeenth century internal toilets may have been widespread, for instance the popular **Orbis**, included a picture of a house showing an internal toilet.¹²⁰ Anecdotal evidence suggests the prevalence of privies. A puritan was described as rushing into

¹¹³Sabine, *Latrines (xerox)*, 309

¹¹⁴Sabine, *Latrines (xerox)*, 307

¹¹⁵Sabine, *Latrines (xerox)*, 306

¹¹⁶ Boorde, *Regiment*, p.236-7

¹¹⁷ Boorde, *Regiment*, p.248

¹¹⁸*Description of England*, 199

¹¹⁹Rye, *Foreigners*, 78

¹²⁰ Comenius, *Orbis*, 146-7

the 'house of office', among other places, to pray.¹²¹ It was quite frequent for women to have stillbirths in the 'house of office'.¹²² We hear of a three year old girl killed when a privy collapsed on her in the early seventeenth century.¹²³

There were, of course, those who broke the rules, but even the reactions to this indicate the widespread norms. John Aubrey tells an amusing story of the necessity to defecate in public due to an emergency - q.v.xxx¹²⁴ Country housewives, we are told, used magic to try to stop boys from defecating outside their front doors.¹²⁵ People were constantly being presented in the courts for urinating or defecating in the wrong place; for instance a person was presented in the Maldon borough court in 1585 for 'going out to make water' in the streets.¹²⁶ By the seventeenth century, in the second largest city, Norwich, not only were there public lavatories (people were presented for not maintaining them) but each house in the city was ordered to have a 'house of office'.¹²⁷ Likewise in London, there were supplications for the building of both privies, in specific houses, and 'common' ones, or general lavatories.¹²⁸ Of course, there would be differences between town and country. Yet it would appear that in the countryside also, people were getting into the habit of using a receptacle, and not merely going out to the nearest free spot. For instance, we are told that 'in the house of a country weaver or shoemaker...a tub stood in that part of the loft occupied by the men, for private uses.'¹²⁹ Some of the most delightful descriptions of the problems of using privies are contained in nineteenth-century

¹²¹ Watkins, *Puritan Experience*, p.94

¹²² Petty, *Papers*, 2, p.166

¹²³ Forbes (ed.), *Aldgate*, p.140

¹²⁴ Aubrey, *Brief Lives*, p.195

¹²⁵ Thomas, *Religion*, p.544

¹²⁶ M.N. *Maldon Records*, 1

¹²⁷ Slack, *Norwich Plague*, p.2

¹²⁸ Forbes (ed.), *Aldgate Chronicle*, p.95

¹²⁹ *Manners of Westmorland*, p.13

accounts. One is in Flora Thompson's **Lark Rise to Candleford**, where she gives a very amusing picture of what happened in a nineteenth-century Oxfordshire village.¹³⁰ The classic account is in **The Specialist** which describes the construction and etiquette of the smallest room.(REF)

The evidence for the nineteenth century is coloured by the problems caused by the rapid growth of large cities. It is clear that the long-standing institution of the 'privy' was still accepted as the ideal, but there were far too few of them. Sanitary inspectors reported that 'There are very few houses in town which can boast of either water-closet or privy, and only two or three public privies in the better part of the place exist for the great bulk of the inhabitants.'¹³¹ Or again, they reported how 'The privies are in a most disgraceful state, inaccessible from filth, and too few for the accommodation of the number of people, the average number being two to 250 people.'¹³² In Gateshead, 'The want of convenient offices in the neighbourhood is attended with many very unpleasant circumstances, as it induces the lazy inmates to make use of chamber utensils, which are suffered to remain in the most offensive state for several days, and are then emptied out of the windows.'¹³³

The problem is well illustrated by the case of Edinburgh in the eighteenth century. With its tall buildings with separate residences opening off a central stair-well, Edinburgh was particularly difficult to clean. It was impossible to have a separate privy for each house. In the absence of running water and pipes, in order for the excrements from each of the levels to reach the collection point, the shortest way was to throw it out of the window onto the streets. A good account is provided by Thomas Wright in the 1730s (xxx). 'The different stories of these lofty buildings are ascended by flights of steps, which they here call winds, and at each story - for the most part - a different family dwells...The inhabitants of this city are not accommodated with necessary houses¹³⁴; each family, therefore, provide themselves with close-stools; at ten in the evening a person goes about the city with a drum, to give notice to the people in the streets to get out of the way; every family then empty their close-stool-pots out of the windows into the streets, and early in the morning persons appointed for the purpose clean the streets and take as much of it away as possible, leaving the rest in vacant places, covered with ashes, to take away afterwards.' Wright noticed a few effects of this. 'This practice causes a nasty smell in the streets, which

¹³⁰ Thompson, *Lark Rise to Candleford*, p.9 xxx

¹³¹ Chadwick, *Reports*, p.116

¹³² Chadwick, *Report*, p.112

¹³³ Chadwick, *Report*, p.95

¹³⁴ i.e. privies, AM

is very disagreeable, especially to strangers.¹³⁵

By the middle of the nineteenth century, the two systems of water closet and throwing the excrements onto the street co-existed in Edinburgh. 'Within these few years, the practice of introducing water-closets into houses has become pretty general, wherever it is practicable; but in the greater part of the old town nothing of the kind can be accomplished from the want of drains. There are drains in the leading thoroughfares, but few closes possess these conveniences, and water is also sparingly introduced into these confined situations. You will therefore understand that a want of tributary drains and water is a fundamental cause of the uncleanly condition of the town.'¹³⁶

Until the system of water-cleansing began to emerge, the normal method was to require householders to empty their own excrements, or to hire people to do this. For instance, in eighteenth-century London householders were often provided with barrels 'that had to be emptied at intervals by the householder.'¹³⁷ This was also the system in Paris. 'Since 1350 people had been obliged to place waste in cesspits under their houses, which were then emptied by cesspit cleaners. This system, which in Paris changed little between the fourteenth and eighteenth centuries, was modified in the nineteenth century...'¹³⁸

Neither private nor municipal emptying was very satisfactory. Even if the liquid waste could be disposed of separately, the solid waste from a household of six would weigh over 100 stone per year - and would be unpleasant to move through the city streets. It would be tempting to leave it until it could not be ignored any longer or, if it were shifted, to throw it away at the nearest point. Thus Marshall describes how in eighteenth-century Manchester, 'Householders preferred the easier way of tipping them into the streets or onto the public refuse heaps under cover of darkness.'¹³⁹ As Chadwick reported in the middle of the nineteenth century, 'It is proved that the present mode of retaining refuse in the house in cesspools and privies is injurious to the health and often extremely dangerous. The process of emptying them by hand labour, and removing the contents by cartage, is very offensive, and often the occasion of serious accidents.'¹⁴⁰

¹³⁵ Wright, *Autobiography*, p.85

¹³⁶ Chadwick, *Report*, p.106

¹³⁷ Marshall, *People*, p.168

¹³⁸Goubert, *Conquest*, 97

¹³⁹ *People*, p.168

¹⁴⁰ Chadwick, *Report*, p.117

The real test was London, which had emerged as the largest city in Europe. We would expect health to deteriorate rapidly as the medieval system of privies and chamber-pots could no longer cope with the hundreds of tons of human excrement that were being produced each day. Instead, the pressure caused changes which led to the emergence of a great city which became a model for sanitary reform throughout Europe - not nearly as clean as Tokyo or Osaka, but far more so than Madrid, for instance, where Kames reported that "Till the year 1760 there was not a privy..."¹⁴¹

A full account of what happened would take us to the whole structure of local government in medieval and early modern England and the way in which authorities and people combined to develop a tolerable system of drains and sewers. The history of municipal involvement in the problem of sewerage disposal dates for our purpose from the reign of Henry VIII. As Chadwick wrote, 'So much of the structural arrangements as depended on drainage was provided for by the Commissions of Sewers who were invested with valuable powers by the Statute of Henry VIII cap.5.s.1/3; the authority of these Commissions "to be directed into all parts within this realm where need shall require, according to the form ensuing, to such substantial persons as shall be named by the Lord Chancellor and Lord Treasurer, and the two chief justices, or by three of them, whereof the Lord Chancellor to be one", to cause "to be made, corrected or repaired, amended, putdown or reformed, as the case shall require, walls, ditches, banks, gutters, sewers, gates, cullices, bridges, streams, and other defences by the coasts of the sea and marsh ground".'¹⁴² There was thus provision for a sewage and drainage system, and it was probably being developed steadily in the sixteenth and seventeenth centuries.

The opportunity for a new infrastructure was provided by the Fire of London in 1666. The improvements were summarized by Benjamin Franklin. 'Before the city was rebuilt, that ingenious architect Sir Christopher Wren, planned and built the common sewers, as they continue to this day; and they are a lasting monument of his judgment and attention to the health and welfare of its inhabitants. These, together with the removal of signs and sign-posts, new paving and cleansing the streets, have been attended with such happy affects, that London and Westminster are now ranked among the most healthy spots in the island...'¹⁴³ Franklin further elaborated this. 'The advantages of drains and sewers are remarkably felt in London, which, before the fire of London, was frequently affected with contagious malignant fevers. Before this period all the waste water and filth remained above ground...'¹⁴⁴ Now the

¹⁴¹ Kames, Sketches, p.248

¹⁴² Chadwick, Report, p.348

¹⁴³ Franklin, Writings, 6, p.320

¹⁴⁴ Franklin, Writings, 6, p.320

sewage was taken away, or held in larger receptacles. Furthermore sewage removal became a profitable business. 'Night Men' had elaborate cards printed. For example Henry Hastings promised that he Decently performs what he undertakes. Empties Vaults and Sespools, unstops Funnels and Cleans Drains, at the very Lowest Prices. N.B. I have the new invented Machine Cart for the Quick dispatch of Business.¹⁴⁵

It was these changes, which among others, Short thought contributed to a lowering of mortality in the eighteenth century. He noted that 'some places have been very industrious and successful in this Part of the Policy, they have opened and cleaned their Ditches and Sewers, let off their Sludge and nasty standing Water, so that all Filthiness is more easily and better carried off, their Streets widened, and made straight, their Houses, Rooms and Windows built loftier etc.'¹⁴⁶

The second great effort, which would extend the London experiment throughout the cities of the Kingdom and to all classes, did not come until the middle of the nineteenth century. The system and its limited spread was described by Chadwick. 'The comparatively recent mode of cleansing adopted in the wealthy and newly-built districts by the use of water-closets, and the discharge of all refuse at once from the house through the drain into the sewers, saves the delay and the previous accumulation, and it also saves the expense of the old means of removal.'¹⁴⁷ If applied wholesale, this would overcome the problems so graphically described in many inspector's accounts. 'I was requested to survey the dilapidations to several houses in the immediate neighbourhood of High-street, upon passing through the passage of the first house, I found the yard covered with night-soil, from the overflowing of the privy, to the depth of nearly six inches, and bricks were placed to enable the inmates to get accross dry shod.'¹⁴⁸ The problem was not removed by merely draining the sewage away. As Chadwick wrote, 'The chief objection to the extension of this system is the pollution of the water of the river into which the sewers are discharged.'¹⁴⁹ An anecdote illustrates just one dimension of the problem in relation to the growing use of toilet paper. 'There is a tale of Queen Victoria being show over Trinity by the Master, Dr.Whewell, and saying, as she looked down over the bridge: "What are all those pieces of paper floating down the river?" To which, with great presence of mind, he replied: "Those, ma'am, are notices

¹⁴⁵ Wright, Decent, p.145

¹⁴⁶ Short, Increase, p.36

¹⁴⁷ Chadwick, Report, p.120

¹⁴⁸ Chadwick, Report, p.118

¹⁴⁹ Chadwick, Report, p.120

that bathing is forbidden".¹⁵⁰ There were a number of disasters with the water supply before the solutions were found and the increasing threat of cholera overcome. In this battle the new technologies of the industrial revolution, steam and iron, combined with the deepening understanding of chemistry and hence disinfection, tipped the balance decisively in favour of health. This development may have been one of the major ingredients in the dramatic fall in mortality rates in Europe and America from the 1860s.¹⁵¹

The major change to a modern system of human waste disposal was based on one other major invention, namely in the way excrement was collected from the human being and conveyed into the sewage system. This was where the English made their largest contribution to overcoming the problems of dense urban populations and the accumulation of faeces and urine.

The English solution to the question of how to collect excrement within the house were the chamber pot (jerry) and the water closet.

(APPENDIX. The development of the English water closet : a-wc)

As Goubert writes 'The modern, individual WC which, in the West, has today superseded all other devices for getting rid of human excrement, is the direct descendant of the British "water closet"'.¹⁵² This technological break-through, spreading through cities, finally allowed urban dwellers to have the best of both worlds - a clean and sweet-smelling 'house of office' which was as attractive as going out into the countryside, yet located in a little room in their houses. The delights of a sweet-smelling toilet had long been known to the Japanese whom, we have seen, used it as a place for meditation and the composition of poetry. The same became possible in England, and no less a figure than Charles Darwin may have taken advantage of the new opportunities.¹⁵³ It is difficult to imagine what New York, Tokyo or Rome would be like today if the water-closet was suddenly abandoned. It was a solution which, in the longer term, was to replace the Japanese system of night-soil removal. Yet it was one which could only exist at a high level of wealth and with a huge infrastructure of water pumping and sewage piping. Until about 1850, the Japanese solution was probably far more efficient for the total population than anything in the West.

What I hope to have shown is that many of the elements of an alternative set of solutions had been

¹⁵⁰Pudney, Smallest, 115

¹⁵¹note: see for example Hardy, Water (xerox), 266

¹⁵²Goubert, Conquest, 97

¹⁵³quoted in Pudney, Smallest, 129

developed in England. The requirement that people use private rooms (privies) early, that they use the receptacle in the privy, that they had a responsibility to keep it clean, this gradually merged into a system of water-flushed toilets and drains which started in London and spread over the country. We must therefore be careful when drawing inferences from a remarks such as 'It was not until the second half of the nineteenth century that these risks were largely controlled - in London by new sewage systems and measures for purification of water supplies'¹⁵⁴ or that 'the primitive sewage systems which served ineffectively in previous centuries, deteriorated under the pressures created by the greatly enlarged populations of the industrial towns.'¹⁵⁵ 'Primitive' they may be in our terms, but by the standards of most early modern societies the English were developing an unusual and probably moderately successful set of solutions to the disposal of human waste.

Furthermore, we need to be sceptical of theories which posit a great change in mentality or conceptions of decency in the nineteenth century. For instance, when Goubert argues that 'Embarrassment and prudishness, which had hitherto been absent from an agrarian culture in which excrement was valued for its power as a fertilizer and healing agent, were now fostered by the puritan ideology of the nineteenth century. Within the space of two generations (1860-1914) lavatories became an integral art of the domestic universe,'¹⁵⁶ he may be saying something that is true of France, but it is certainly not true of England. If the argument has any validity, it would be the puritan ideology of the sixteenth, rather than the nineteenth century which we would need to look at in England, with its equation of spiritual and human 'dirt.

Conclusion.

Thus England had taken a less efficient course in the short term, throwing away all this rich fertilizer. In the long term the English solution became that adopted by the world and replaced the Japanese one, even in Japan. As Pudney put it with quiet irony, 'In the four corners of the earth, British culture and civilization effortlessly left its mark in those pre-propaganda days, in the polite, untranslated, variously pronounced but highly prized terms **Water-Closet** and **W.C.**'¹⁵⁷

The effects on health in the period up to the middle of the nineteenth century were probably not as dramatic in England as in Japan. Dysentery, typhoid and cholera were much more prevalent. Nevertheless, the developing techniques of town planning and the application of capital and ingenuity to the solution of this problem undoubtedly made England as healthy in this respect as any European

¹⁵⁴ McKeown, *Rise*, p.125

¹⁵⁵ McKeown, *Rise*, p.125

¹⁵⁶ Goubert, *Conquest*, p.95

¹⁵⁷ Pudney, *Smallest*, 30

country, with the exception of Holland. Holland, combining the Japanese use of night soil with the developing techniques of sanitation, was even more exceptional.

The level of sanitation in England seems to have just about kept pace with population growth and thus kept the level of enteric disease within bounds. In this case, just to keep the mortality from these diseases from rising was a considerable achievement. In fact as we have seen earlier, dysentery was thought to have declined dramatically in the eighteenth century.

Thus the curious attention to the disposing of faeces, which distinguished the English from most other European nations, played an important part in the mortality patterns I am trying to explain. How far this was intentional it is difficult to say, but there can be no doubt that although the micro-organisms that cause dysentery, typhoid, para-typhoid and cholera could not be seen before the later nineteenth century, there was a widespread belief in a relationship between sickness and dirt. Thus it was not just some instinctive aversion or puritan fastidiousness which lay behind these essential developments, but a sense of public order and public effect, combined with an intuition that the disposal of excrement, human and animal, was somehow linked to illness.

Looked at from afar, the Japanese and English solutions to the problem of excrement represent the two extremes. In Japan, attitudes towards the body and its dirt were relaxed and the need for excrement was great. The 'night soil' solution emerged out of this synthesis. In England, the body and its excrements were regarded with considerable aversion. A mixture of prudery and disgust developed from very early on. This is well caught by Pudney, who writes of 'a secondary **taboo** that would appear to be peculiarly Puritan in origin, and for this reason of a specifically Anglo-Saxon character, a **taboo** found principally in Britain and in the United States of America, not against dirt itself or filthy habits, but **against any mention of things relating to excretion.**'¹⁵⁸ People wanted to rid themselves of this disgusting matter as secretly and swiftly as possible. But because of the farming methods, no-one wanted the excrement. Out of this antithesis an entirely different solution emerged - the water closet.

¹⁵⁸4 ney, Smallest, 21