## EXPLAINING THE ESCAPES

### The difficulty of analytic reasoning.

We have now seen some of the features of the escape from the Malthusian trap in England and Japan, and in particular the control of mortality and fertility. We have furthermore seen a few of the important consequences of this escape. This is the relatively easy part, for we are dealing with effects and their further effects. The difficulty is to reason back from these effects to their causes. The problem is similar to that in any kind of detective work and in the following chapter I shall use the work of one of the world's most famous detectives, Sherlock Holmes, as a model of how to approach problems.

The problem of analytic reasoning is well laid out by Holmes in 'A Study in Scarlet'. He explained to Watson that 'Most people, if you describe a train of events to them, will tell you what the result would be. They can put those events together in their minds, and argue from them that something will come to pass. There are a few people, however, who, if you told them a result, would be able to evolve from their own inner consciousness what the steps were which led up to that result. This power is what I mean when I talk of reasoning backwards, or analytically.'[1] In this case, and the 'Sign of Four', Holmes was 'compelled to reason backward from effects to causes.' [2] This is the case in the problem we face as historians. We know that something very unlikely happened, we know the manifestations and we can guess at some of the consequences. Yet we find it much more difficult to work back to the causes. Holmes remark applies here: 'Now this was a case in which you were given the result and had to find everything else for yourself.'[3]

In order to achieve this, Holmes developed a number of techniques which are useful for the historian. The first is the famous method of exclusion. Holmes alludes to this frequently. 'Eliminate all other factors, and the one which remains must be the truth.'[4] He reminds Watson, 'Ho often have I said to you that when you have eliminated the impossible, whatever remains, **however improbable,** must be the truth?'[5]

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[1] Doyle, Works, 61.

[2] Doyle, Works, 313.

[3] Doyle, Works,61.

[4] Doyle, Works, 66.

[5] Doyle, Works, 80; see also p.270 (Adventure of the Beryl Coronet), and p.776 (The Adventure of the Bruce-Partington Plans).

All alternatives must be investigated and eliminated. 'One should always look for a possible alternative and provide against it. It is the first rule of criminal investigation.'[6]

Let us start by using this method of exclusion, a technique which was also used, with explicit reference to the Holmsian method, in a famous book by Thomas McKeown which was one of th most original attempts to solve part of our problem, namely how mortality was lowered in eighteenth century England. I will follow McKeown's order of proceeding through the possible causes of the effect.

**The virulence of infective organisms and their hosts.**

The first possibility is a change in the 'virulence of the infective organism and its host...'[7] Two types of argument could be put forward here. The first suggests that autonomous changes, for instance in the virulence of a virus or bacteria, may alter the pattern of mortality. This argument has been suggested most frequently to explain the sudden and inexplicable disappearances of diseases, for instance of leprosy in western Europe from the fourteenth century, of the English sweating sickness in the middle of the sixteenth, of plague from most of Europe after 1666, or of a number of diseases in Europe in the later part of the nineteenth century. The mysterious disappearance of a number of major diseases was alluded to by Creighton and more recently by Greenwood who wrote of the mysterious disappearance of tuberculosis and scarlet fever in the later nineteenth century.[8]In relation to bubonic plague, as we have seen, it has been suggested that its sudden disappearance may have been due to changes in the behaviour of the rat, or flea, which had nothing to do with human intervention. As Chambers notes, 'If this is true, it is perhaps the most gigantic example of good luck in the recorded history of mankind: the dietetic peculiarities of the free-ranging flea, apparently enabled the industrial Revolution to proceed on its way.'[9] Zinsser writes 'It is not easy to account for the decline of great epidemics in Europe after 1850. One might assume an unaccountable cyclic change in the characters of prevalent diseases.'[10]

[6] Doyle, Works,640 (The Adventure of Black Peter).

[7]McKeown and Brown in ed. Heer, 37

[8] Creighton, Epidemics, i,280; Greenwood, Crowd Diseases, 65.

[9]Chambers, Economy, 151

[10]Zinsser, Rats, 292

While not discounting the possible changes in viruses and other micro-organisms due to a number of complex factors, it is probably safe to leave this "X" factor on one side for the moment. In general, McKeown and Brown are probably right in arguing that 'although there have undoubtedly been changes in the character of individual infections, it is unreasonable to attribute to this alone the progressive decline in mortality from infections as a whole after many centuries in which mortality remained high.'[11] In chapter four of his book McKeown considers whether the decline in mortality was due to a change in the character of the diseases themselves, specifically in the relations between viruses, bacteria and man. He concludes that 'the decline of mortality from infectious diseases was not caused substantially by a change in their character...'[12]

Kunitz more reecently argues that 'Certainly there were adjustments between parasites and hosts, but it is unlikely that either the waning of virulence of the former, or the rapid selection for resistance of the latter, are adequate explanations of the decline in European mortality.' In relation to inherited resistance, Kunitz states that there is 'very little evidence from recent epidemiological studies that inherited resistance is significant in any infectious disease, with the exception of the association between the haemoglobinophies and malaria.'[13]

It seems unlikely that changes in virulence of infective organisms and their hosts will solve many of the particular problems in relation to England and Japan. Like the climate, we need to keep this factor in mind, and to realize that it may well have been important. The more we learn, the more we appreciate the complex and constantly evolving situation in the relation between mankind and the surrounding world of micro-organisms.

There are inter-actions between different diseases so that it is possible, for instance, that as one increases it may lead to a decrease or increase in others. This was a point noted by Creighton on several occasions. He showed for instance that as typhus declined, typhoid rose, or as measles increased, smallpox declined. [14] This synergy of diseases has recently been noted by Cohen, who shows how the spread of malaria and hookworm increases measles. [15] The implication of this is that we have to study all the major diseases alongside each other since, for example, the absence of malaria is not just

[11]McKeown; Brown in ed. Heer, Population, 38

[12] McKeown, Modern Rise, p.91.

[13]Kunitz, Speculations, 364, 250

[14] Creighton, Epidemics, ii,202, 629,659.

[15] Cohen, Health, 54.

important in itself but influences many other diseases. Also, a long time perspective is needed in order to notice the patterns. As Creighton wrote, 'In the long period covered by this history we have seen much coming and going among the epidemic infections, in some cases a dramatic and abrupt entrance or exit, in other cases a gradual and unperceived substitution'. [16] This leads him to his principal theory when trying to explain the mysterious disappearance of diseases like sweating sickness or plague, namely 'the only law of extinct disease-species which our scanty knowledge points to - the law of succession, or superseding, or supplanting of one epidemic type by another.[17]

**The control of disease through medicine.**

The next chapter of McKeown's book is titled 'The Medical Contribution'. When it was first observed that mortality in England appeared to drop, or at least not to grow, despite denser urban populations in the later eighteenth century, and again when it was observed that many diseases seemed to wane in the later nineteenth century, it was natural to assume that this had something to do with medical science. It was known that hospitals and the medical profession developed in the eighteenth century, and there was the notable development of smallpox vaccination. Can we not solve at least part of the puzzles by reference to medical discoveries?

If we start with the more familiar case of England and Europe, there is a general consensus that it is impossible to explain much of the phenomenon in terms of medical advances before the last decades of the nineteenth century. Even then, we are told, 'TB wasn't the only infectious disease to wane, doctorless, at the end of the nineteenth century. In fact, the mortality graphs for most of Europe's fatal crowd diseases all took amazing and uninterrupted dives before antibiotics had been invented.'[18] Likewise, Dubos noted that '...in the United States and Great Britain, the mortality from most infectious diseases began to decrease long before any method of prophylactic or therapeutic control had become available.'[19]

In relation to the puzzles about disease patterns of an earlier period, it is exceedingly difficult to explain them, except very partially in the case of small-pox, in terms of medical techniques or knowledge. The author who has most fiercely argued that it was a decline in mortality which was significant in explaining the population increase of the eighteenth century, and who, both as a doctor and a theorist might be thought to be especially likely to find that improvements in medical technology

[16]Creighton, Epidemics, ii, 631.

[17]Creighton, Epidemics, i, 280.

[18]Nikiforuk, Fourth, 138

[19]Dubos, Adapting, 236; cf 171

provided the answer is Thomas McKeown. Yet he concludes at the end of his chapter on 'The Medical Contribution' that 'except in the case of vaccination against smallpox...it is unlikely that immunization or therapy had a significant effect on mortality from infectious diseases before the twentieth century.'[20] Elsewhere he repeat his view that 'the fall in the death rate during the eighteenth and nineteenth centuries was not the result of medical treatment...Only in the case of vaccination against smallpox is there any clear evidence that specific therapy had a substantial effect on the prevention or cure of disease earlier than the twentieth century.'[21] In a recent article on the mortality transition of the nineteenth century, Szreter has endorsed McKeown's view that formal medicine played little part. [22]

In relation to England and western Europe most historians are agreed that formal medicine - doctors, surgeons, hospitals, medicines - had very little influence on health before the late nineteenth century. This had been argued by Helleiner in an influential article and Flinn summarized the situation a few years ago. 'Mortality in early modern Europe was, one might say, in God's sector; man was virtually powerless to control either its general levels or its short-run fluctuations.'[23] For instance 'The French historians who have studies in great detail the work of the French medical profession in the last decade or two of the **ancien regime** have revealed much energy, dedication, and humanity but no effective techniques or drugs for curing the killing infectious diseases.'[24] The great development of hospitals shows the growth of compassion, 'but in the absence of any effective cures, it can hardly have made any impact on mortality levels.'[25]

Roy Porter, who has worked extensively in this field, comes to a similar conclusion. 'There is scant evidence that medicine could do much throughout this entire period to counter the most lethal diseases.'[26] Apart from smallpox inoculation, 'Medicine succeeded in making only marginal inroads into

[20]McKeown, Modern Rise, 108.

[21]McKeown, in Heer, ed, Readings, 36.

[22] Szreter, Mortality, xerox, 3.

[23]Helleiner, 'Vital Revolution', Cambridge History, 90; Flinn, European (xerox), 18

[24]Flinn, European (xerox), 99-100, 336, 368-69

[25]idem

[26]Porter, Disease, 62

serious diseases.'[27] Advances in anatomy, physiology, chemistry and observation in hospitals 'did not bear fruit for saving lives till the last third of the nineteenth century and, above all, in the twentieth century.'[28] In a survey of the possible cause of the drop in mortality in the eighteenth century, Beaver likewise dismisses medical causes.[29] A world in which there were very few adequate cures for any disease, where most people had no access to whatever medicine there was, where hospitals were scarce and usually killed more than they cured, such an environment is well described by Keith Thomas.[30] Even if we accept that 'the old view that hospitals were "gateways to death"' is 'probably exaggerated'[31], they can hardly explain the situation we are trying to understand.

During the four centuries up to the industrial revolution there was almost no increase in the knowledge about the causes of the diseases that affected large parts of the population. Until the last quarter of the nineteenth century, for instance, nothing useful was known about the cause of most of the major killers - malaria, cholera, plague and so on. Hence there was no real improvement in the availability of useful cures or preventive medicine.

The solution to the question of the partial escape from the world of illness would not seem to lie in medical technology. This is not an easy view to accept. As Petersen concludes, 'It is hard for modern man to assimilate the fact that until the twentieth century the contribution of medicine and medical institutions to the reduction of mortality was so slight as to be almost insignificant.'[32]

The relative unimportance of medical science can be demonstrated forcefully if we look at the situation as last as the mid 1890's, well after dramatic changes had occurred. If we look at Creighton's majestic two volume **History of Epidemic Diseases**, published in 1891 and 1894, it is clear that this leading medical historian had little idea of what caused most major epidemics. Influenza, he believed was caused by earthquakes, plague, cholera and typhoid by the miasma from decomposing bodies, typhus by cold and poverty, dysentery by miasma of faecal origin, leprosy by eating too much salty meat and

[27]ibid, 63

[28]Idem

[29] Beaver, Milk (xerox),pp.248-9.

[30]4 mas, Religion, 8-14

[31]Porter, Eighteenth, 285

[32]Petersen, Malthus, 160; Essays, ii, 219ff

rough clothing.[33] **Chamber's Encyclopedia** of 1895 was likewise unsure of the causes of most diseases. Smallpox was 'is universally acknowledged to be a specific contagion of whose nature we are in the most profound ignorance'. Measles was one of 'the group of blood diseases', but no cause was given. Influenza 'is connected with some particular condition of the atmosphere, but what that condition is not known'. The cause of plague was unknown, though it seemed to be carried in clothes, bedding and through direct contact. For typhus 'no characteristic organism has been discovered'. Malaria was the result of miasma, 'an earth-born poison which is generated in soils...it is impossible to state definitely what the morbific agent really is.' The causes of cholera were still disputed, but it was probably, like typhoid, the result of a germ found in water and milk, as Koch had argued. Dysentery was a disease of the blood found in low and swampy regions, 'Some authorities...regard dysentery as itself a malarial disease; but this is not certain.([34] Given this state of almost total ignorance of causes, it is not surprising that the medical profession in the West were largely helpless.

The conclusion, that we cannot explain either the surprisingly low mortality rates, or their apparent decline during urbanization, also seems to apply to Japan. The state of health in Japan is unlikely to have been much influenced by medicine before the later nineteenth century. Indigenous Japanese medical treatment was described by a series of foreign doctors. From the end of the seventeenth century, Kaempfer, Thunberg, von Siebold, Pompe and Willis all attest to the great interest of the Japanese in medicine, their adaptation of the sophisticated Chinese system of medicine which had been imported in the eighth century, and their thoroughness. Bowers notes the 'singular veneration that the Japanese people hold for medicine. They are uniquely conscious of minor aberrations from a complete sense of well-being; they place full reliance on medicine to prevent or correct such deviations.'[35] This was 'a cultural trait which has impressed many visitors through the centuries.'[36]

The general impression one receives from the account by visiting doctors is that Japanese medicine, based heavily on Chinese methods was effective in certain ways. For instance acupuncture and the burning of mugwort XXX or 'moxa' may well have relieved certain diseases; and Japanese knowledge of herbal remedies may have been deeper than that of European doctors on the whole. As von Siebold noted, 'botany, as connected with the knowledge of simples is diligently cultivated, and the medicines used are said to be generally beneficial; the chief reliance, however is upon diet, acupuncture and the moxa.'[37] However, there are no grounds for believing that the patterns of epidemic and endemic disease

[33] Creighton, Epidemics, ii,415; i,176,337; i,162; ii,214;; ii,217; i,110.

[34] See Chamber's Encyclopedia under these disease names.

[35]Bowers, Pioneers, (xerox),199.

[36]Bowers, Pioneers, ix

[37]Siebold, Manners, 217

can be explained by the nature or developments of medical practice in Japan. In relation to the major diseases which face an agrarian population, malaria, smallpox, measles, typhoid, dysentery, tuberculosis, bubonic and pneumonic plague, Japanese doctors were as ill-equipped as their European counterparts. There were no hospitals, no effective drugs, surgery was even more primitive than in Europe, theories of disease causation as inaccurate. It would seem that there was probably little to choose between Japan and Europe up to the early nineteenth century in terms of formal medicine.

Indeed, by the eighteenth century, visiting western physicians felt that they were well ahead of their Japanese counterparts in both understanding and treatment. Thunberg wrote that 'Their knowledge of fever and other internal disorders can be no other than very superficial and their mode of cure very precarious, as their physicians have no insight into Anatomy and Physiology...'[38] He later commented that 'The Japanese have not the least knowledge of anatomy; neither have they the most distant idea of the circulation of the blood.'[39] By the early nineteenth century, the Japanese with their energy and inquisitiveness were starting to absorb western medicine with enthusiasm. Their flexibility and pragmatism were attested to by many, for example Pompe in the 1830s,[40] and Willis a few years later.[41]

Thus while it is difficult to see how formal medical knowledge or practice can have contributed much to the absence of so many diseases up to the middle of the nineteenth century, there can be little doubt that the Japanese speed of assimilation of western medical advances did help them from the 1850s onwards. As they became subject to a new set of diseases, particularly cholera, typhus, plague and tuberculosis, brought from the west, they managed to avoid much of the disaster that hit other areas. Morse in the 1870s was very impressed by the speed at which the Japanese adopted western medicine and moved ahead in public health. 'More solid advance has been made in foreign medical practice in Japan that in any other department of western science. Medical colleges and hospitals are already firmly established. A chemical laboratory was immediately started to analyze all imported drugs...The rapid displacement of the Chinese medical cult for the rational and scientific practice of western methods...'[42]

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[38]Thunberg, Travels, iv, 73

[39]Thunberg, Travels, iii, 200

[40]Wittermans, Pompe 95-6

[41]Cortazzi, Willis, 141-2, 257

[42]Morse, i, 40

The efficiency of the Japanese is shown in relation to their treatment of cholera. Their rapid and thorough actions signified great organizational skill, an all-embracing government, and a long tradition of trying to keep out and deal with illness. All of these were vital background factors.

**Exposure to infection; the environment.**

McKeown's next chapter considers whether there were environmental changes which could have decreased the exposure to infection. He looks at the way disease was transmitted through water, food and insect vectors and is unable to find any significant improvements which would have led to a lowered mortality rate. The only exception he notes was a possible improvement in standards of hygiene which may have affected typhus, but this came late in the eighteenth century amongst the well-to-do and its effects only reached the majority of the population in the nineteenth century, well after the events we are trying to understand occurred. The basic measures which made a difference, 'purification of water; efficient disposal of sewage; provision of safe milk; and improved food hygiene', were only 'introduced progressively from the second half of the nineteenth century'.[43] This is at least a century too late to be relevant to the puzzle of declining mortality in England.

Recent studies have tended to support McKeown's negative assessment. Although sanitary reforms and public health have been suggested as the explanation of the health changes of the later nineteenth century by Szreter,[44]this is a less convincing explanation in relation to the earlier health transitions of the period up to 1840. Demographic historians, taking account of the awful conditions created by the urban growth in England, rule this out. Peterson remarks that 'during Malthus's lifetime hygienic conditions probably worsened or, at best, improved far too slowly to account for the decline in mortality from roughly 1760 to 1840.'[45] As Schofield concludes, 'there is little evidence that in most areas sanitation and public-health measures improved during the period.'[46] Or again, 'it is very difficult to argue in favour of the importance of public-health measures in Europe before the second half of the nineteenth century.'[47]

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[43] McKeown, Modern Rise, 126-7.

[44]Szreter, Mortality (xerox),pp.17,26.

[45]Petersen, Malthus, 159

[46]Schofield, Decline (xerox), 5

[47]Schofield, Decline (xerox), 9

One of the many paradoxes was noted by Helleiner. Speaking of the growth of cities from the sixteenth century, he wrote that 'It needs little imagination to realize that the emergence of these large human anthills created a host of problems - food, water, and fuel supply, sewage and garbage disposal, housing, paving, etc...'[48] Yet, despite this, the 'same period which witnessed an unprecedented concentration of human beings in large cities, creating conditions favourable to epidemic outbreaks, paradoxically enough saw 'The beginnings of a development that was to end with the extinction of plague...'[49]

**The nutritional state.**

By the process of exclusion, McKeown was only left with one other possibility to explain changes in eighteenth century mortality, namely changes in nutrition. He argued that this was indeed the explanation, not merely because 'other explanations are inadeuqate', but also because there are 'positive grounds' for believing there was an increase in nutrition. He cites improvements in agriculture and in particular the spread of the potato and maize. He therefore concludes that 'In Europe there was a large increase in food supplies between the end of the seventeenth cetury and the mid-nineteenth...this increase coincided with a substantial reduction of mortality from infectious diseases and, it is suggested, was the main reason for it.'[50] Later, in his summary, he restates this central finding. 'The great increase in food production from the end of the seventeenth century resulted in improvement in nutrition, and tipped the balance in favour of the hosts and against micro-organizms which cause disease.'[51]

There is only one problem. This is that historians who have worked on eighteenth and nineteenth century England have been unable to find that improvement in nutrition which McKeown believed must have occurred. Indeed, many of them have found the revers. Much work on nutrition, height and weight since McKeown's book has shown that nutrition, if anything, worsened from the middle of the eighteenth century. Thus, in relation to the correlations of nutrition, mortality and morbidity 'A major conclusion of the conference held in Bellagio which was attended by historians, demographers, and nutritionists was a recognition that almost all present interpretations of the evidence are not sufficient to explain the facts.'[52] As Schofield writes, the early McKeown thesis 'is based on the supposition that

[48]Helleiner, Vital Revolution (xerox), p.83 in Cambs. Hist.

[49]Helleiner, Vital Revolution (xerox), p.84 in Cambs. Hist.

[50] McKeown, Modern Rise,p.142.

[51] McKeown, Modern Rise, 161.

[52]Schofield, Decline (xerox), 21

nutrition and living standards were improving between 1700 and 1850, when there is no evidence of improved nutritional levels, and indirect proof that living standards were in fact worsening during that period.'[53] Schofield here also refers to more general 'living standards'. Yet recent evidence of the effects of the industrial and urban revolutions apparently undermines this. 'The old school of thought which claims that a rising standard of material life led to a decline in mortality sufficient to promote the observed population expansion is, quite simply, blown to smithereens.'[54]

Several recent authors have recently noted the fact that income and health were not correlated. Razzell writes that 'the fact that there were very substantial increases in life expectancy among all occupational groups during the eighteenth century suggests that economic factors were not primarily responsible for the reduction in mortality.'[55] Riley noted the expected correlation between income and health, but found that data on sickness 'suggest instead an inverse picture' in which sickness rates 'improved in the early stages of industrial development, remained more or less stable during the middle decades of the century, and then deteriorated, reaching their highest levels in the 1890s.[56] Dobson notes the absence of any correlation between mortaltiy rates, wages and grain prices in the later seventeenth and early eighteenth century.[57]

In relation to height and weight, the evidence is still somewhat confused, although there has been a great deal of work. On the basis of somewhat insecure figures, Kunitz has suggested a long-term decline in the height of males between the fourteenth and eighteenth centuries in England.[58] There is no evidence of improvement in the first half of the eighteenth century when mortality began to fall. The general pattern thereafter is unclear. There was probably a decline in height between about 1750 and 1790 or a little later, considerable improvement between about 1800 and 1830, perhaps decline again from then to the 1860s. Steckel, for instance, thought that the bad period were 'in the late eighteenth century or during the period roughly from 1820 to 1850. The major surges in agerage heights occurred approximately

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[53]Schofield, Decline (xerox), 9

[54]Various, Review Symposium (xerox), 153

[55]Razzell, Essays (xerox), p.198

[56]Riley, Disease (xerox), p.560.

[57]Dobson, Hiccup (xerox), p.418

[58] Kunitz, Height (xerox),pp.274-5; Newman (ed.), Hunger in History, (xerox), p.392.

from 1790 to 1820 and from near the end of the nineteenth century through the twentieth century.'[59] Fogel gives a slightly different picture, with the mean heights of boys from the labouring classes 'relatively steady from c.1775 to c.1790 and then declined for two decades, the loest point coming somewhere near 1810...From c.1810 to c.1828 mean heights increased rapidly...'[60]

While there is disagreement about the fluctuations, authors appear agreed on two basic facts. One is that a permanent and major improvement did not occur until towards the end of the nineteenth century. Steckel writes that after the mid-1700s there were various fluctuations but 'little permanent improvement was attained until the modern secular trend in heights began near the end of the nineteenth century.'[61] The second is that there is no evidence of a marked improvement to show an improvement in nutrition to support the McKeown thesis. At the more pessimistic end, Razzell summarizes the situation by stating that '...recent work by Nicholas, Steckel and Kimlos on the average heights of the working population suggests that there was an overall decline of the standard of living from about 1730 to 1860.'[62] Likewise Shammas uses the recent work on height and weight to suggest a decline in nutrition in the second half of the eighteenth century.[63] Even if we take the more cautious view stated by Fogel, namely that 'England appears to have been at least half a century into into its Industrial Revolution before witnessing a marked improvement in the heights or nutrition of its laboring classes.'[64] we are left with the puzzle pointed out by Kunitz notes, '...mortality began to decline at least half a century before the height data indicate a significant improvement in nutrition.'[65]

The paradox was pointed out by a number of authors some years ago. The leading authority on English food, Drummond, noted that there is indisputable evidence that a marked deterioration occurred in the eighteenth century in the quality of many foodstuffs, particularly those likely to be bought by the poorer

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[59]Steckel, Heights, 186.

[60]Fogel, Stature (xerox), 466.

[61]Steckel, Heights, 185.

[62]Razzell, Essays (xerox), 220.

[63]Shammas, Consumer (xerox), p.122.

[64] Fogel, Stature (xerox), 480.

[65] Kunitz, Height (xerox), p.278.

people.'[66] On the other hand, 'It is a remarkable fact that the second half of the eighteenth century saw a striking improvement in the general health of the poeple in spite of the declining standard of living among a large section.'[67]

The **cul-de-sac** in which historians have found themselves is well illustrated by the overview by Flinn. He concludes that 'The explanation of this all-important decline in mortality is likely to be complex rather than simple and must lie in a range of possibilities in two main interacting areas - nutrition, which includes the quality (vitamin diversity) of diet as well as merely the quantity and regularity of food; and the diminution of the incidence of infectious diseases.'[68] Yet as we have seen, neither of the interacting areas is at all plausible as a major explanation. As another more recent summary puts it, 'In the end, we are left more or less where we started: preventive measures, including immunization, quarantines, and **cordons sanitaires**, as well as the improvements in public hygiene described by Riley, undoubtedly helped reduce mortality from some infectious diseases in the seventeenth and eighteenth centuries, but it is difficult to believe that they had an impact comparable to that of the sanitary reforms of the late nineteenth century.'[69] Or as Mathias put it, 'The influences which combine to affect levels of health, morbidity and mortality...are manifold and their interactions still largely unravelled...' [70]

**The Holmsian method: chains of causation & analytic reasoning.**

A second area to consider is the nature of analytic reasoning in relation to the complex chains of causation. One difficulty is that in working back from effects to causes we move along often complex links which are neither self-evident to the historian or to those who live in the society itself. In pursuing these links we are faced with a considerable problem of separating the vital from the incidental, the true links from the false. This was a problem constantly alluded to by Holmes.

He explained to Holmes that 'It is of the highest importance in the art of detection to be able to recognize out of a number of facts which are incidental and which vital. Otherwise your energy and attention must be dissipated instead of being concentrated.'[71] If possible, 'amid a perfect jungle of

[66]Drummond, Food, p.250

[67]Drummond, Food, p.250

[68]Flinn, European (xerox), 101

[69]Ramsey, Environment (xerox), 616

[70] Mathias, Transformation, 283.

[71] Doyle, Works, 373 (The Adventure of the Reigate Squire).

possibilities...' one needs to keep a 'close hold on the essentials' and 'so be guided along the crooked and winding path.'[72]

HERE

But what are the essentials? (Perhaps insert stuff at end on environment here...)

**The Holmsian method: the argument from silences/absences.**

The argument from silences - the dog that did not bark (as with war and famine..)

**The Holmsian method: the importance of tiny details.**

The idea of minute details - the devil is in the detail.

**The Holmsian method: deviations from the normal tendency.**

The expected outcome - the two dumbbells etc.

Other Holmsian methods....
(The case of the non-barking dog - war and famine, animals in Japan.
The case of long chains - various.
The importance of details - chopsticks, mosquito nets, shoes etc.)

The first is that 'the environment' covers so much ground. To take one example, we are told, 'Virchow invented the best and shortest definition of disease every written: "life under altered conditions". By altered conditions he meant changes in diet, trade, travel, housing, clothes and water - in short, the total environment.'[73] Even this list does not exhaust the 'environment', and it is likely that there will be many small, complex, but significant sets of environmental factors which were important, but are easy to overlook. The difficulty is well illustrated by a contemporary example of the possible causes of disease and death in a town in north-eastern Brazil. 'On the Alto do Cruzeiro the threats to infants and

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[72] Doyle, Works,764 (The Singular Experience of Mr., John Scott Eccles.)

[73]Nikiforuk, Fourth, 11

small children in the environment seem to come from everywhere; the polluted and overly "treated" public faucet water, the gritty dirt under little bare feet, the insects in the air, the sluggish and insidious snails along the muddy banks of the river, the ticks on domestic animals, the "kissing bugs" (i.e. Chagas' disease) burrowed into the mud walls of huts, the worms in the pit latrine, the mad dogs roaming the garbage pits of the Alto, the spoiled milk left out overnight, the salted and sun-dried meat covered with maggots in a dish under the roof beam, the tuberculin fruit vendor in the public market, the wheezing, pneumatic child next door.'[74] Where would one start to investigate for what was most significant in the 'environment' in such a situation?

(to add in above, as appropriate...)

As Szreter notes, McKeown's use of the method of exclusion is not valid, because he does not examine all the suspects with equal care.[75] One tactic is to return to those at the scene of the crime to look again at what contemporaries thought was significant. They may have clues which it is worth following up.

In the eighteenth century, as the change was happening, a number of analysts agreed that the improvements in health were caused by changes in public health. Black thought that a set of changes had occurred together. 'In London, the lodgings are now warm and dry, and the people in general tolerably well clothed: animal meat is eat fresh; vegetables, though perhaps not universally consumed in sufficient quantity, are certainly in much greater abundance than formerly.'[76] Place and Malthus both relied on William Heberden's analysis. Place wrote 'Dr. Heberden has adduced several circumstances which prove, that the country is generally more salubrious than formerly; he says, "The cause of so great an alteration in the health of the people of England, I have no hesitation in attributing to the improvements which have gradually taken place, not only in London, but in all great towns, and in the manner of living throughout the kingdom, particularly to cleanliness and ventilation".'[77] In very similar words, Malthus described how 'Dr. Heberden draws a striking picture of the favourable change observed in the health of the people of England since this period; and justly attributes it to the improvements which have gradually taken place, not only in London but in all great towns; and in the manner of living throughout the kingdom, particularly with respect to cleanliness and ventilation.'[78]

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[74]Scheper-Hughes, Without Weeping, p.361

[75]Szreter, Mortality (xerox),11.

[76]Black, Arithmetical, 234

[77]Place, Population, 257/58

Heberden himself had written that the absnece of plague was a result of 'our own change of manners, our love of cleanliness, and ventilation...' More widely, 'it is highly probable, that good diet, and good spirits, and cleanliness, and fresh air, and proper clothing, and exercise, may all contribute to render the body less susceptible to disease.'[79]

In an analysis of epidemics in 'Constantinople and other towns of the East' Malthus wrote that 'The human constitution cannot support such a state of filth and torpor: and as dirt, squalid poverty, and indolence are, in the highest degree, unfavourable to happiness and virtue', it was 'a benevolent dispensation, that such a state should, by the laws of nature, produce disease and death, as a beacon to others to avoid splitting on the same rock.' Plague had acted as such a beacon to the English until 1666, when 'the removal of nuisances, the construction of drains, the widening of the streets, and the giving more room and air to the houses, had the effect of eradicating completely this dreadful disorder...' Malthus noted that 'In the history of every epidemic it has almost invariably been observed that the lower classes of people, whose food was poor and insufficient, and who lived crowded together in small and dirty houses, were principal victims.'[80]

Thus Malthus believed that, along with the elimination of war and famine, the major reason why England avoided a rising mortality with early urbanization and industrialization, and indeed showed an apparent tendency in the opposite direction, lay in environmental and behavioural changes. Improved mortality statistics were due to changes in the environment: town planning, housing, cleanliness and diet. Blane a little later concentrated on similar reasons for the noted decline in mortality was apparent to him. He thought that Malthus 'has not laud sufficient stress on the other, though subordinate necessities of life - clothing, habitatiofn and fuel.'[81]"The other causes of superior health, seem to consist in a general improvment in the habits of life, particularly with regard to ventilation and cleanliness, a more ample supply of water, particularly since the new water companies began to supply the town, greater abundance, and better quality of food, the improved state of medicine, and the better management of children."[82] Elsewhere he gave a slightly different list. 'The causes appear chiefly referable to the more ample supply of food, clothing, and fuel; better habitations; improved habits of cleanliness and ventilation

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[78]Malthus, ii, 182

[79]Herberden, Observations, pp. 96, 98.

[80]Malthus, ii, 153

[81]Blane, Dissertations, p.166.

[82]Blane, Dissertations, p.173.

in persons and houses; greater sobriety and improved medical practice.'[83] He added another set of reasons which are particulary relevant to the decline in infant and maternal mortality which he had noted. 'This dimunution of mortality seems importable to the improvement of ventilation and cleanliness, and to the more judicious management of children, such as greater warmth in apartments and clothing, and the correction of the vulgar error that exposure of children to the open air at all seasons is salutory, whereas this exposure in the winter and spring months brings in the most common and fatal of all diseases incident to young children, while this practice prevailed, imflammation of the lungs...?[84] Place had been similarly impressed by the changes, particularly in the health of the working classes. He thought that 'Much of this is attributable to the increased salubrity of the metropolis, much to the increase of surgical and medical knowledge, much also to the change that has taken place, not only in London, but all over the country, in the habits of the working classes, who are infinitely more moral, more sober, more cleanly in their persons and their dwellings, than they were formerly, particularly the women.'[85] A few years later, Pompe in Japan was to attribute the low level of post-partum 'convulsions' 'to the loosely worn clothing which does not impede the blood circulation, the regularity in their food habits, the meticulous care of the skin, and the regularity of their way of life.'[86] In the light of the strong belief in the importance of environmental factors, and recognizing that any answer is likely to lie in a very complex set of factors and their interaction, let us look at some of the possible environmental factors at work in England and Japan.

[83]Blane, Dissertations, p.181

[84]Blane, Dissertations, p.123

[85]Place, Illustrations, p.253.

[86]Wittermans, Pompe (xerox), 42