

From: Alan Macfarlane, **The Savage Wars of Peace: England, Japan and the Malthusian Trap** (Blackwell, Oxford, 1997)

## CHAPTER ONE. THE MALTHUSIAN TRAP

For nation shall rise against nation, and kingdom against kingdom: and there shall be famines, and pestilences, and earthquakes, in diverse places. All these are the beginning of sorrow.<sup>1</sup> In the words of the gospel such was the state of humankind.

It was a world from which it seemed impossible to escape. In 1788 Edward Gibbon completed his great work on **The Decline and Fall of the Roman Empire**. The following year he surveyed the world around him. There seemed little improvement over the last two thousand years. 'The far greater part of the globe is overspread with barbarism or slavery: in the civilized world, the most numerous class is condemned to ignorance and poverty...The general probability is about three to one that a new-born infant will not live to complete his fiftieth year.'<sup>2</sup>

Gibbon's world was one with a population of less than one thousand million inhabitants. As we stand at the end of the twentieth century, only a little over two hundred years later, there are more than seven times as many humans on earth. Yet we see a world in which many millions have escaped from a daily fear of war, famine and disease. For the privileged living in parts of Europe, America and Asia, there is wealth and stability undreamt of by peoples in most past civilizations.

It is easy to assume that this change was inevitable; because this happened, it had to happen. Yet when we regard the many millions who are still trapped in poverty, disease and the fear of war, and when we remember that the escape into relative security has only occurred within a brief space of time, we are reminded that it was not inevitable.

In order to gain a full sense of how unlikely were the events which have unfolded over the last two hundred years it is helpful to go back to the writings of a man who stood at the transition point between the old world and the new. In 1798, nine years after Gibbon's **Memoir**, Thomas Malthus published his **Essay on the Principles of Population**. In this short essay he laid out the reasons why agrarian civilizations seemed to be trapped for ever in misery. Alongside Adam Smith's **Wealth of Nations**, it is the clearest analysis of the structural tendencies of **ancien regime** societies and their intrinsic limits to growth.

In the second edition of his **Principles** Malthus himself came to revise his views and to write of strong **tendencies** rather than iron **laws**. Furthermore, we now know that some of his predictions were wrong and others seem to have been suspended, at least temporarily. Indeed that is one of the major themes of

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<sup>1</sup>Matthew, 24:7-8

<sup>2</sup> Gibbon, *Memoirs*, 217.

this book. Yet without subscribing either to his views of 'progress' or to his representation of the iron laws, it is nevertheless essential to outline in stark detail his early vision. Only then can we fully understand the unlikelihood of the transition which has taken place.

Malthus drew attention to three facts. The first is that human beings are very strongly motivated by a desire for sexual intercourse. 'The passion between the sexes has appeared in every age to be so nearly the same, that it may always be considered, in algebraic language, as a given quantity.'<sup>3</sup> All else being equal, men and women will mate as soon as possible after puberty. If such mating is only permitted within marriage, 'Such is the disposition to marry, particularly in very young people, that, if the difficulties of providing for a family were entirely removed, very few would remain single at twenty-two.'<sup>4</sup>

The second fact is the high fertility of humans. If this high fertility is combined with a reasonable rate of mortality, such early and frequent mating will lead to rapid population growth. He cited examples of populations which had doubled in twenty years or less. In fact, he deliberately erred on the conservative side. As Alfred Sauvy points out, 'a population not practising contraception and benefiting from present-day medical science could in an extreme case double in thirteen years...'<sup>5</sup> This is because of the natural fecundity of human beings: 'If a couple comes together at puberty, stays together until the woman's menopause, and has no recourse to contraception, its average number of children will be about ten. In a population living in the best possible conditions this would probably increase to twelve.'<sup>6</sup> Numbers can thus easily double in each generation and this means that a vast population will build up very quickly.

The third fact is that economic resources, and in particular food production, cannot keep pace with this population growth within a basically agrarian economy largely dependent on human labour. This is due to the law of diminishing marginal returns. While there may be periods when rates of growth in agriculture rise to three or four percent **per annum**, which is equivalent to a doubling of food in a generation, such periods cannot be sustained for more than a few decades.

The result of these facts was a powerful tendency for population to outstrip resources. 'Population, when unchecked, increases in a geometrical ratio. Subsistence increases only in an arithmetical ratio. A slight acquaintance with numbers will shew the immensity of the first power in comparison of the second.' 'Assuming then my postulata as granted, I say, that the power of population is indefinitely greater than the power in the earth to produce subsistence for man.' Malthus did not find this particularly cheering. 'It is, undoubtedly, a most disheartening reflection that the great obstacle in the way to any extraordinary improvement in society is of a nature that we can never hope to overcome. The perpetual tendency in the race of man to increase beyond the means of subsistence is one of the general laws of animated nature which we can have no reason to expect will change.'<sup>7</sup>

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<sup>3</sup> Malthus, *Population*, I, 312

<sup>4</sup> Malthus, *Population*, II, 52

<sup>5</sup> Sauvy, *General*, 410

<sup>6</sup> Sauvy, *General*, 349

<sup>7</sup> Malthus, *Principle*, 71, 79, 198-99

Malthus identified two types of check to population which might operate. There were the 'preventive' checks: 'moral restraint', referring to delayed or non-marriage, and 'vice', by which he meant all kinds of artificial birth control. Secondly there were the checks which raised the death rate, what Malthus termed the 'positive' checks. These were again divided into what he termed 'vice', that is man-made destruction, and 'natural' disasters. He distinguished them thus: 'Of these positive checks, those which appear to arise from the laws of nature may be called exclusively misery; and those which we bring upon ourselves, such as wars, excesses of all kinds, and many others, which it would be in our power to avoid, are of a mixed nature. They are brought upon us by vice, and their consequences are misery.' He included in the positive checks a very wide range of causes of death. 'The positive checks to population include all the causes, which tend in any way prematurely to shorten the duration of human life, such as unwholesome occupations; severe labour and exposure to the seasons; bad and insufficient food and clothing arising from poverty; bad nursing of children; excesses of all kinds; great towns and manufactories; the whole train of common diseases and epidemics; wars, infanticide, plague, and famine.'<sup>8</sup> These 'positive' checks tended to act in concert. 'The vices of mankind are active and able ministers of depopulation. They are the precursors in the great army of destruction; and often finish the dreadful work themselves. But should they fail in this war of extermination, sickly seasons, epidemics, pestilence, and plague, advance in terrific array, and sweep off their thousands and ten thousands. Should success be still incomplete, gigantic inevitable famine stalks in the rear, and with one mighty blow levels the population with the food of the world.'<sup>9</sup>

Malthus believed that unless people espoused the path of 'moral restraint', delaying their marriages or not marrying, all other measures would be in vain. For instance, all attempts to eradicate poverty would be hopeless. 'It is not in the nature of things that any permanent and general improvement in the condition of the poor can be effected without an increase in the preventive check; and unless this take place...everything that is done for the poor must be temporary and partial: a diminution of mortality at present will be balanced by an increased mortality in future.'<sup>10</sup> Likewise, attempts to eradicate particular forms of misery, whether war, famine or disease, would merely deflect mortality into another 'channel'.

The idea of the 'channel' is an important one in Malthus' thought. He seems to have taken the concept from Heberden. 'Dr. William Heberden published, not long since, some valuable observations on this subject deduced from the London bills of mortality. In his preface, speaking of these bills, he says, "the gradual changes they exhibit in particular diseases correspond to the alterations which in time are known to take place in the channels through which the great stream of mortality is constantly flowing".' To tamper with particular channels is therefore a waste of time. 'Now if we stop up any of these channels it is perfectly clear that the stream of mortality must run with greater force through some of the other channels; that is, if we eradicate some diseases, others will become proportionally more fatal. In this case the only distinguishable cause is the damming up a necessary outlet of mortality.' This means that 'we should reprobate specific remedies for ravaging diseases; and those benevolent, but much mistaken men, who have thought they were doing a service to mankind by projecting schemes for the total extinction of particular disorders.'<sup>11</sup>

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<sup>8</sup>Malthus, Summary, 250

<sup>9</sup> Malthus, Principle, 118-19

<sup>10</sup>Malthus, Population, II, 252

<sup>11</sup> Malthus, Population, II, 180,181,179

This leads Malthus from what Boulding calls the 'Dismal Theorem' to the 'Utterly Dismal Theorem'. 'Since equilibrium between resources and population can be maintained only by misery and/or vice, and since population tends to rise to the limit of available subsistence, any improvements leading to an increase in the production of food must increase the equilibrium population, and hence, presumably, increase the sum of human misery and vice.'<sup>12</sup> Malthus half seriously contemplates the corollary of this. If people are not prepared to use the preventive checks, they should try to diminish misery by encouraging the 'positive' checks to operate as soon as possible. 'To act consistently, therefore we should facilitate, instead of foolishly and vainly endeavouring to impede, the operations of nature in producing this mortality; and if we dread the too frequent visitation of the horrid form of famine, we should sedulously encourage the other forms of destruction which we compel nature to use.' 'Instead of recommending cleanliness to the poor we should encourage contrary habits. In our towns we should make the streets narrower, crowd more people into the houses, and court the return of the plague.'<sup>13</sup>

This is indeed Utterly Dismal, yet it flows directly from his argument that, without the preventive check, 'distress and poverty multiply in proportion to the funds created to relieve them.'<sup>14</sup> This may be a bitter pill to swallow, as he admits. Yet there is no point in trying to avoid the facts: 'discouraging as the contemplation of this difficulty must be to those whose exertions are laudably directed to the improvement of the human species, it is evident that no possible good can arise from any endeavours to slur it over or keep it in the background.'<sup>15</sup>

Malthus was not alone in outlining the world of misery within which agrarian societies appeared to be trapped. His ideas were fully consistent those of many with many of the other great classical economists and social scientists. Those who first began to analyse with precision what was happening were the brilliant set of political economists who worked in Scotland mainly during the period between 1740 and 1790 - Ferguson, Millar, Kames, Robertson, Hume and Smith. It was obvious to such thinkers that humankind was caught in a trap, whereby population would always outstrip resources. David Hume pointed out that 'Almost every man, who thinks he can maintain a family, will have one; and the human species, at this rate of propagation, would more than double every generation. How fast do mankind multiply in every colony or new settlement.'<sup>16</sup> The harder people worked, and the more technologically ingenious they were, the more their numbers would grow. Ferguson wrote, 'If a people, while they retain their frugality, increase their industry, and improve their arts, their numbers must grow in proportion.'<sup>17</sup>

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<sup>12</sup> Kenneth Boulding, quoted in Malthus, *Principle*, 47

<sup>13</sup> Malthus, *Population*, II, 179

<sup>14</sup> Malthus, *Population*, II 274

<sup>15</sup> Malthus, *Principle*, 199

<sup>16</sup> Hume, *Essays*, 224

<sup>17</sup> Ferguson, *Essay*, 142

The most forceful expression of the argument was by Adam Smith. His **Wealth of Nations** was the blueprint for a new age and suggested the 'Natural Progress of Opulence'. Yet his message is inconsistent, for in relation to the laws of population he seems to have realized that it was impossible for sustained economic growth to occur. There was a built-in contradiction which would forever trap agrarian societies and prevent their escape from eternal misery. It was clear that 'Every species of animal naturally multiplies in proportion to the means of their subsistence, and no species can ever multiply beyond it.' Mankind was just another species in this respect, for 'men, like all other animals, naturally multiply in proportion to the means of their subsistence.' He pointed out that an improvement in wealth would lead to a decline in mortality among the common people, hence more children would survive and the population would increase. Likewise, increased wealth through increased wages would lead to increased fertility. 'The liberal reward of labour, therefore, as it is the effect of increasing wealth, so it is the cause of increasing population', or, as he put it in a marginal note, 'high wages increase population.'<sup>18</sup>

E.A. Wrigley has summarized the position of the classical economists. As far as Smith was concerned 'his view of the prospects for growth in general induced him to discount the possibility of a prolonged or substantial improvement in real wages, and to fear that the last state of the labourer would prove to be worse than the first...' His successors 'developed arguments that served to reinforce the pessimism that Smith displayed about the secular prospects for real wages.' Thus 'looking to the future, they saw no likelihood of significant further advance and some danger of regression.' The capitalism they described 'was not expected by them to produce the changes now termed the industrial revolution.' For while they predicted increases in output 'they expected them to be broadly matched by increases in population, leaving the ratio between the two little changed.'<sup>19</sup> In other words, there was no escape from the circle of misery. The only question was whether a country would be 'trapped' at a low or high equilibrium, in other words with sparse or dense populations. As Wrigley notes, 'pre-industrial societies were by definition in a position of negative feedback. Each period of economic growth was eventually cut short before reaching the point at which it was self-sustained and progressive.'<sup>20</sup>

Malthus' first edition of the **Essay** provided little in the way of proof for the theory, though this was to be supplied in the much expanded second edition. Yet the Malthusian analysis has largely been borne out as a description of most civilizations before the nineteenth century. Almost all agrarian societies have conformed to his predictions. If there were gains in resources, these were soon swallowed up by rapidly rising population through a high fertility rate and lowered death rates. This would lead to denser populations which in turn led to the negative feed-back of a rise in mortality. This cycle prevented long-term and sustained economic growth. As David Landes summarized the evidence 'An amelioration of the conditions of existence, hence of survival, and an increase in economic opportunity had **always** been followed by a rise in population that eventually consumed the gains achieved.'<sup>21</sup>

Wrigley has described the Malthusian world as one 'where fertility and mortality are high, population is

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<sup>18</sup> Smith, *Wealth*, I, 89, 163, 90

<sup>19</sup>Wrigley, *Two Kinds*, 99,101,103,103

<sup>20</sup> Wrigley, *Population and History*, 111

<sup>21</sup> Quoted in Chambers, *Economy*, 10 (Chambers' italics).

large relative to available resources and growth is curbed principally by the positive check.<sup>22</sup> In fact, within the long period when it was mortality which tended to be most important in checking the growth of population there were two distinct patterns. Conventional population theory assumed that in the thousands of years up to the 'demographic transition', since mortality and fertility were clearly balanced, this was achieved by 'perennial malnutrition and everyday disease.' Thus it was suggested that year in and year out mortality ran at about the same level as fertility both at a high level.<sup>23</sup> Wrigley describes this situation as one where 'mortality was always high because the disease environment was so unfavourable...in this sense high mortality could be said to have "caused" high fertility.'<sup>24</sup>

There are, however, very few cases of this pattern in recorded history. Much more common is the situation of dramatic crises of mortality, as described by the anthropologist Peter Kunstader. 'A more nearly accurate model of demographic conditions...within which most non-modern men have lived may have been high fertility (beyond the level needed for replacement in normal years) with low-to-medium death rate, with occasional or periodic variations in death rates due to natural disasters (floods, earthquakes, climatic fluctuations..., insect plagues, crop failures,...etc. ) and probably more recently, epidemic diseases.'<sup>25</sup> In this situation 'the disease environment was less deadly but social conventions made early and universal marriage mandatory. As a result, fertility was high and because rapid growth had to be short-lived, mortality was high too.'<sup>26</sup> What Wrigley implies is that the mortality now took a different form. Instead of perennial high mortality, in most years mortality was considerably below fertility, but every few years or generations the growing population would be hit by a 'crisis', one or more of the Malthusian positive checks, namely war, famine and disease.

Agrarian civilizations have almost all been characterized by a situation where the normally high fertility is periodically balanced by the mortality crisis. The model and the evidence for it was described by Carlo Cipolla. He wrote that '...the material available suggests that any agricultural society - whether sixteenth-century Italy, seventeenth century France, or nineteenth-century India - tends to adhere to a definite set of patterns in the structure and movements of birth- and death-rates. Crude birth-rates are very high throughout, ranging between 35 and 50 per thousand....Death rates are also very high, but **normally** lower than the birth-rates - ranging generally between 30 and 40 per thousand.' As a result of these usual figures, the 'population of an agricultural society is characterized by a normal rate of growth

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<sup>22</sup>Wrigley and Schofield, *Population*, xxiv. The 'positive check' is, of course, mortality. This has been termed a 'high-pressure regime' by Wrigley.

<sup>23</sup>Macfarlane, *Population and Resources*, 305; this 'classic' model has more recently been termed the 'west African' model by Wrigley because it has been observed in that part of Africa.

<sup>24</sup>Wrigley and Schofield, *Population*, xxiv-xxv

<sup>25</sup>In Harrison and Boyce, *Structure*, 315. Wrigley has termed this the 'Chinese' model.

<sup>26</sup>Wrigley and Schofield, *Population*, xxiv

of 0.5 to 1.0 per cent per year.' Such a growth rate would mean, over long periods, a staggering growth of population. If it had occurred, for instance, since 10,000 B.C., population 'would form today a sphere of living flesh many thousand light years in diameter, and expanding with a radial velocity that...would be many times faster than light.'<sup>27</sup>

This continued growth has clearly not happened, not because of perennially high mortality, but rather as a result of periodic 'crises'. It has been avoided 'because throughout the demographic history of agricultural societies, death-rates show a remarkable tendency to recurrent, sudden dramatic peaks that reach levels as high as 150 or 300 or even 500 per thousand.' These peaks were the result of wars, epidemics and famines, which Cipolla notes, 'wiped out a good part of the existing population.' It was the 'intensity and frequency of the peaks' that 'controlled the size of agricultural societies.'<sup>28</sup>

In 1960 Cipolla noted that the detailed demographic records for agrarian societies were still 'poor'. In the following years information improved greatly and a good deal of it was summarized by T.H. Hollingsworth in 1969 in his work on **Historical Demography**. The evidence he assembled on India, China, Egypt and other great agrarian civilizations fully supported the picture which Cipolla had outlined.

The history of China is a classic example of these difficulties. China in 1700 was well abreast of Europe in terms of technology, as Joseph Needham and his collaborators have shown.<sup>29</sup> Its population at this date was about 160 million. The peace and stability of the Chi'ing dynasty, combined with an apparent absence of widespread epidemic and endemic disease, allowed the Malthusian tendency towards rapid growth to occur. The population doubled to about 310-330 million in the hundred years to 1800 and increased to 420-440 million by about 1850.<sup>30</sup> The result, according to many, was the growing misery of the bulk of the population. People had to work harder and harder, for 'Despite enormous growth in population and food supply, the Late Imperial era saw a decline of productivity per labourer in agriculture.'<sup>31</sup>

Malthus noted that 'The Jesuit Premare, writing to a friend of the same society says, "I will tell you a fact, which may appear to be a paradox, but is nevertheless strictly true. It is, that the richest and most flourishing empire of the world is notwithstanding, in one sense, the poorest and the most miserable of all. The country, however extensive and fertile it may be, is not sufficient to support its inhabitants. Four times as much territory would be necessary to place them at their ease."<sup>32</sup> In the words of James

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<sup>27</sup> Cipolla, *World Population*, 76

<sup>28</sup> Cipolla, *World Population*, 77; see also Cipolla in Glass & Eversley (eds.), *Population*, 573.

<sup>29</sup> Needham et al., *Science and Civilization*.

<sup>30</sup> Nakamura and Miyamoto, *Population*, 247; Fairbank, *Paradox*, 168

<sup>31</sup> Fairbank, *Paradox*, 170

<sup>32</sup> Malthus, *Population*, I, 130

Nakamura and Matao Miyamoto, the tendency was 'to push the level of per capita income down toward the subsistence level - that is, there was no escape from the Malthusian trap.'<sup>33</sup> The 'crisis' came in the form of famines and the devastation of the Taiping rebellion of the mid nineteenth century in the aftermath of which many millions died.<sup>34</sup>

Turning to the west, it would appear that most of Europe hit a Malthusian ceiling in the late sixteenth century. Research on European populations supported the universal and devastating nature of the crises that affected the population. Fernand Braudel noted the effects of the 'biological **ancien regime**...the balance between births and deaths, very high infant mortality, famine, chronic undernourishment and virulent epidemics...' He noted that towards the end of the sixteenth century 'Man's very progress became a burden and again brought about his poverty', for in 'probably the whole Western world, population again became too dense. The monotonous story begins afresh and the process goes into reverse.'<sup>35</sup> Jan De Vries asks 'Could Europe have reached an economic ceiling in the early seventeenth century in which a precarious balance between population and food supply was constantly threatened by inadequate harvests?' He answered in the affirmative, pointing to the fact that 'In Ireland, Germany, Poland, Denmark and the Mediterranean countries varying combinations of plagues and chronic warfare and insecurity caused a substantial decline in population.'<sup>36</sup> In a recent survey of the evidence, Massimo Livi-Bacci has given a similar description. 'The situation for the various European countries is not much different from that of Siena. The sixteenth, seventeenth, and early eighteenth centuries are characterized by subsistence crises, with the attendant adverse demographic consequences, at a rate of two, three, or more per century.'<sup>37</sup>

Italy was a particularly dramatic example. 'Italy in the decade 1620-30 embarked on a long period of economic decline which lasted beyond the middle of the eighteenth century and during which levels of living progressively deteriorated.'<sup>38</sup> Principally as a result of disease, 'During the first half of the seventeenth century, Italy as a whole declined from 13 to 11 million inhabitants, while northern Italy, the industrial heartland of Europe, lost a quarter of its population.'<sup>39</sup> France was in the same predicament. 'The population of the French kingdom within its frontiers of 1700, whether we look at it as a whole, or in its age groups...oscillates vigorously from minimum to maximum around a sort of equilibrium position representing possibly 19 million Frenchmen. In 1700 it probably stood nearer the minimum than the

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<sup>33</sup> Nakamura and Miyamoto, *Population*, 264

<sup>34</sup> Spence, *Search for China*, 170-184

<sup>35</sup> Braudel, *Capitalism*, 53,3

<sup>36</sup> De Vries, *Economy*, 6-7,184

<sup>37</sup> Livi-Bacci, *Population*, 81

<sup>38</sup> Cipolla in Glass & Eversley (eds.), *Population*, 574

<sup>39</sup> De Vries, *Economy*, 4-5

maximum point.' In the early eighteenth century, France may have been trapped in the usual positive feed-backs of war, famine and epidemic: 'decisive changes did not occur in France before the second half, and maybe not before the end, of the eighteenth century.'<sup>40</sup> Even prosperous Holland seems to have some kind of Malthusian ceiling in the middle of the seventeenth century.<sup>41</sup> In Mediterranean Europe, for instance in parts of Spain, parish register evidence suggests that 'crisis mortality continued to be important well into the nineteenth century.'<sup>42</sup>

It is not difficult to see how powerful the 'positive' checks were. The first and most destructive was war, not only because of deaths in battle, but much more significantly through the disruptions it caused leading to famine and epidemics. The shadow of famine hung over the world until very late. The demographic position at the end of the seventeenth century is made clear by K.F.Helleiner. 'Certainly, as far as the demographic situation of this period is concerned, there was little if anything to herald the impending changes. Man was still very much at the mercy of the elements. As late as the 1690s a succession of poor and indifferent harvests created severe subsistence crisis in almost all countries of Europe. So far from growing, the population declined here and there, as dearth and starvation stalked through the lands from Castille to Finland, and from the Scottish Highlands to the foothills of the Alps.'<sup>43</sup> Such famine would bring disease in its wake.

Thomas McKeown pointed out that many diseases are density dependent: 'in the early phase of human existence, from the beginning of the pleistocene up to about 10,000 years ago, infectious disease due to micro-organisms specifically adapted to the human species was almost nonexistent'.<sup>44</sup> As Alfred Crosby put it, 'Hunters and gatherers had their personal vermin - lice, fleas, and internal parasites - but few of the nomad humans remained long enough in one spot in sufficient numbers to accumulate filth enough to enable mice, rats, roaches, houseflies and worms to multiply in armies. The farmers, however, did just that...' <sup>45</sup> Or as Kenneth Kiple writes, 'so long as humans lived in small isolated bands their disease difficulties would have been largely limited to chronic infections with low infectivity.'<sup>46</sup>

With the establishment of permanent cultivation in about ten thousand B.C., and particularly with the

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<sup>40</sup> Goubert in Glass & Eversley (eds.), *Population*, 473

<sup>41</sup> Van Bath in *Daedalus*, *Fertility*, 610ff

<sup>42</sup> Richard Smith in Bynum and Porter (eds.), *Companion Encyclopaedia*, 1675

<sup>43</sup> Glass & Eversley, (eds.), *Population*, 79

<sup>44</sup> McKeown, *Modern*, 79. Certain diseases, such as malaria, were of course to be found every early in human evolution.

<sup>45</sup> Crosby, *Ecological*, 29; see also 31.

<sup>46</sup> Kiple in ed. Bynum and Porter, *Companion Encyclopedia*, 358-9.

growth of urban civilizations from about four thousand B.C., new diseases emerged. 'Almost all studies that attempt to reconstruct the history of infectious diseases indicate that the burden of infection has tended to increase rather than decrease as human beings adopted civilized lifestyles.<sup>47</sup> This was partly the result of increasing dirt and increasing poverty. The aggregation of large, malnourished populations created the conditions required for the propagation and transmission of micro-organisms and so led to the predominance of infectious diseases as causes of sickness and death. This established a high level of mortality which limited the rate of population growth.<sup>48</sup> But above all, increased density of population allowed a whole new disease ecology to emerge. 'With the domestication of plants and animals beginning in the Near East some 8,000 to 10,000 years ago, humans summoned forth a host of new diseases and in so doing set in motion changes in their disease ecologies that are ongoing today.' These new diseases were supplemented by others as the rise of the first literate and urban civilizations created enough density for viral and other diseases to establish themselves. We are told that 'smallpox and measles, together with influenza, chicken-pox, whooping cough, mumps, diphtheria, and a host of other diseases, arose with growing human populations. These were the illnesses that pass quickly and directly from human host to human host and need no intermediary carrier; in other words, they became the diseases of civilization.<sup>49</sup> Thus a basic contradiction between economy and health begins to build up.

As a country's wealth and commerce grows, it is often most economically rational to concentrate this in densely populated areas, towns and cities. In economic terms this is efficient, overcoming the 'friction of space' and bringing various advantages in terms of division of labour, economies of scale and so on.<sup>50</sup> De Vries summarizes the growth of large cities in western Europe from the sixteenth century: 'Paris, London and the **Randstad** in the 1570s collectively embraced some 370,000 inhabitants. In the next century each grew to surpass the 400,000 mark. By 1700 one and a half million people lived in them.' By 1650 Paris and London were both approaching the half million mark, 'unprecedented in western Europe.'<sup>51</sup>

At the same time, 'Urban populations died at higher rates because the city was crowded and filthy, its streams and rivers polluted with industrial and human waste, its air thick with particles from wood and coal fires, and its streets strewn with waste.'<sup>52</sup> With reference to London, Malthus quoted Graunt's

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<sup>47</sup> Cohen, *Health*, 32. See chapter 4 of Cohen, and especially 48,53-4 for an excellent account of the way in which increasing human density leads to the growth of disease.

<sup>48</sup>McKeown, *Modern Rise*, 162.

<sup>49</sup> Kiple in Bynum and Porter (eds.), *Companion Encyclopedia*, 360,362.

<sup>50</sup> See Davis and Golden in Heer (ed.), *Population*, 55

<sup>51</sup> De Vries, *Economy*, 155,151; the Randstad is the central Netherlands area around Amsterdam.

<sup>52</sup> Riley, *Sickness*, 122.

mid-seventeenth century estimate that it required an annual influx of six thousand people a year just to make up for its population deficit.<sup>53</sup> Wrigley and Schofield estimate that London always killed more people than it produced but that its relative size meant that it was mainly during the period between 1625 and 1775 that it had its decisive effect on national population. In the last three quarters of the seventeenth century it acted as a depressant on population growth and in the 'eighteenth century London continued to act as a severe drain on the surpluses being produced elsewhere; even as late as the second quarter of the century it offset about a half of the national baptism surplus...' It looks as if England had hit a buffer. 'The conditions for a relatively high-level equilibrium trap were beginning to become apparent in late-seventeenth century England.'<sup>54</sup>

Other civilizations where urban populations were growing faced a similar Malthusian feed-back. By the seventeenth century Japan was extremely densely populated. When Engelbert Kaempfer visited it he found that 'The Country is populous beyond expression, and one would scarce think it possible, that being no greater than it is, it should nevertheless maintain, and support such a vast number of inhabitants.' He found many large towns and cities 'the chief whereof may vvy with the most considerable in the world for largeness, magnificence, and the number of inhabitants.' The capital, 'Jedo', later Tokyo, 'is so large, that I may venture to say, it is the biggest town known.'<sup>55</sup> He was right, for with a population of about a million it was the largest city on earth. It is not surprising that Japanese demographic historians have detected a similar negative influence in Japan. Akira Hayami argues that 'Owing to the high death rate in cities, which teemed with workers who had migrated from the depressed countryside, the Kanto and Kinki regions (which included Edo, Kyoto, and Osaka) were subject to the negative-feedback function and their populations stagnated.'<sup>56</sup> The thesis seems to have been accepted by Susan Hanley and Kozo Yamamura: 'while the evidence is only starting to come in', what we do have 'confirms Hayami's hypothesis - and E.A. Wrigley's with regard to premodern Europe - that the cities drained the surrounding countryside of population, thus creating negative growth rates in the areas immediately surrounding cities...'<sup>57</sup>

We are left with a puzzle. It is difficult to see how the 'great transformation' from the world of high mortality and fertility occurred and how the 'Wealth of Nations' was achieved. In order to escape from the trap, societies had to increase their productive power, that is their agricultural and manufacturing wealth. As they did so, they had to avoid too-rapid population growth and the rise of the positive checks of war, famine and disease that seemed inevitably to emerge as populations became more dense. This growing burden of disease and malnutrition as humans moved from hunter-gathering through the phase of early civilizations to the early modern period has been outlined by Mark Cohen.<sup>58</sup> The

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<sup>53</sup> Malthus, *Population*, I, 243

<sup>54</sup>Wrigley and Schofield, *Population*, 169,472.

<sup>55</sup> Kaempfer, *History*, 3, 306,307

<sup>56</sup> In Jansen & Rozman, *Japan*, 293

<sup>57</sup> Hanley & Yamamura, *Economic*, 304

<sup>58</sup>Cohen, *Health*, passim, esp. pp.53-4, 130-2, 140-2.

growing levels of epidemic disease associated with the higher density of agrarian civilizations are surveyed by Kenneth Kiple.<sup>59</sup> As Braudel noted, 'until the eighteenth century, the population was enclosed within an almost intangible circle'. Only then 'were the frontiers of the impossible crossed and the hitherto unsurpassable population ceiling exceeded.'<sup>60</sup>

The difficulty of achieving this change is made clear by Ronald Lee. On the one hand, 'Entrance to a higher ellipse can be gained only from the population densities and levels of technological attainment characteristic of the highest development of the previous technology.' On the other hand, 'Populations such as the Chinese, entrapped in a medium-technology agricultural regime, through prematurely dense population, would not be well situated to make the transition to an industrial economy.' Some variant of the Chinese fate was a common one, and '...many populations would get stuck at relatively low-level equilibria, and thus make no further progress. The more obvious and cheaper technological developments would occur, but those requiring larger collective investments and higher living standards might not.'<sup>61</sup>

Only in very exceptional circumstances could the various negative feed-back mechanisms be avoided. 'Only populations blessed with the most advantageous institutions governing reproduction, surplus extraction, and use of surplus, would be able to pass through the neck of the hyperbola and continue to progress into the next higher technological regime.' For instance, 'Premature population growth, or premature restraint, might render the passage from one stable equilibrium to a higher one much less likely.'<sup>62</sup> It is all a matter of balance, and the factors that allow that balance are many and delicate. What is significant is the narrowness of the room for manoeuvre.<sup>63</sup>

In order to establish what factors were important and the ways in which the balance was achieved, we need to examine cases where the escape from the Malthusian trap apparently occurred. One case might give some possible clues. But if two cases, widely separated in culture and geography, and largely independent historically, could be found, we should be able to penetrate more deeply into the necessary and sufficient causes of the unlikely emergence of a different demographic pattern.

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<sup>59</sup> In Bynum and Porter (eds.), , Companion Encyclopaedia, 358-362; see also Polgar, Evolution and Crosby, Ecological, 29, 31.

<sup>60</sup>Braudel, Afterthoughts, 9

<sup>61</sup> Coleman and Schofield (ed.), Population, 122

<sup>62</sup>In Coleman and Schofield (ed.), Population, 122, 122, 123, 128

<sup>63</sup>Well illustrated in the diagram in Coleman & Schofield (eds.), Population, 123