CHAPTER XVI

Malaria—General Summary

By the beginning of the 19th century, the general advance in society and in particular the efforts of the medical profession, had resulted in some approach to modern health conditions as contrasted with medieval ones. Plague, leprosy, and scurvy were extinct; rickets, smallpox and typhus were scotched, with a definite hope of ultimate elimination.

It is impossible to make any exact numerical statement as to the changed incidence of different diseases since the cause of death was not recorded for the country as a whole until 1836. The sole sources of information before that date are, therefore, the London Bills and the Carlisle Tables. The method of compilation of the London Bills, their obscure and archaic nomenclature, and the fact that the classification was changed from time to time make any detailed comparison impossible. For instance, scarlet fever was at first confused with measles, it was joined with fever in 1731 and made a separate item in 1831. It is possible, however, to compare groups of diseases. Such a comparison was made by Farr for the Liberties of London, the population of which had altered little during the 200 years preceeding 1835.[1] Comparing the two periods 1771–8 and 1801–10:

Total Death Rate.		*Diseases of Childhood and early Infancy ex. Fevers.*	*Small Pox.*	*Fever.*	*Consumption.*	*Dropsy.*
1771–80	50	16·8	5	6·2	11	2·2
1801–10	29·2	7·9	2	2·6	7	1·3

Carlisle Tables

Total Death Rate.	*Small Pox.*	*Fever.*	*Consumption*
25	3·6	4·5	3·3

This table brings out clearly that the main fall was in the diseases of infancy and early childhood,[2] probably at least 14 out of a total reduction of 19 per 1000. Whatever form these diseases may have taken, it may be safely assumed that their cause lay in bad nurture. Conversely their reduction was due to better nurture, i.e., better feeding, healthier dwellings, less drunkenness and immorality among parents, also better medical attention and advice. The reduction of smallpox was directly due to the efforts of the medical profession. This reduction mainly affected the death rate under 5, though in London there would have been more deaths among adults than elsewhere owing to the large immigration from rural districts. Among fevers, probably the most fatal were scarlet fever and typhus. The former, which mainly affected children, in 1831 accounted for one third of the total deaths from fever. Typhus is most fatal in early adult and middle life. Farr pointed out that between 1771 and 1835 fever declined in nearly the same ratio as smallpox. The reduction of fevers was mainly due to the anti-fever campaign though there were other favourable factors.

According to the Carlisle Tables one-third of those dying of consumption were under twenty years of age. The reduction of consumption[3] and dropsy Farr considered to be mainly due to the reduction of fever and dysentery, since consumption and diseases of the kidneys and heart are common after effects of fevers, including under this term enteric and smallpox. Some credit, however, must be given to better food, more sanitary dwellings, and greater temperance. Thus the reduced death rate appears to have been mainly due to a reduction of fevers and of the diseases of infancy, including smallpox. Contemporary authorities believed that there was also great reduction of dysentery (probably enteric), particularly in London. This is quite probable in view of the various improvements in town economy. Francis Place believed that there was also a great reduction in venereal disease, due to greater sobriety and the improvement of morals. The Wesleyan and Evangelical movements, which laid great stress on chastity, must have been favourable factors in this direction. Another disease that afflicted our ancestors, which is now practically extinct in

this country, had been considerably reduced. That disease was malaria. Though probably its direct effect on the death rate was small, its indirect effect must have been great.

MALARIA (Synonyms: ague, paludism, marsh, remittent, intermittent, climatic, jungle, coast fever).

This disease can be caused by three different parasites. The *Plasmodium vivax* which produces tertian fevers, a mild form of malaria which seldom causes death. The *Plasmodium malariae* which produces quartan fevers, this form seldom causes death directly but it sometimes leaves morbid symptoms which ultimately do so. Both these parasites live mainly in the circulating blood and generate there, their toxins therefore produce general symptoms. The third parasite *Lavarania malariae* produces a subtertian fever, it sporulates as a rule in the spleen but it may sporulate in other organs, for instance the brain, intestines, heart or pancreas, it then produces the severe form of malaria known as Malignant Malaria. *Laverania malariae* also causes a chronic form of the disease which may be accompanied by serious lesions of various organs. Malaria, especially the malignant type, often leaves bad after-effects, it may cause mental trouble to the point of insanity and anæmia is a frequent consequence. Children suffer severely and attacks often leave them in a condition resembling that of rickets, their general development is interfered with and in severe cases the onset of puberty is prevented. The miserable physique of the natives of malarious districts is notorious, though the death rate from actual malaria is always lower among the resident population than among immigrants. The residents acquire sometimes an apparent, sometimes a real immunity, but their children suffer from the disease and many die, while the survivors remain under-developed in different degrees. Hard work and under-nourishment make the individual more susceptible to malaria. All three forms of malaria are carried by the female of the anopheline variety of mosquito. In temperate zones these insects generally hibernate in the winter but occasionally emerge and bite on a warm day. In the spring they become active and breed rapidly. Still water is necessary for the existence of the larvae and pupae. The parasites of malaria

also require warmth for their development and a high temperature favours the development of the disease. The *Laverania malariae* requires a greater degree of warmth than other forms, hence the variety of disease caused by this parasite rarely appears in the temperate zone except in the summer or autumn.[4]

England possesses three species of anopheline mosquito but only one of these (*Maculipennis* Meigen) has been proved to be a carrier of malaria under normal conditions. The mild form of malaria was common in certain marshy districts in this country until the middle of the 19th century and sporadic cases still occur from time to time. Owing to the usual difficulties of diagnosis and nomenclature it is very difficult to state anything definite about the incidence of malaria before the second half of the 18th century. The term ague simply means "acute" and was originally very loosely used. It has been suggested that the epidemical agues of the 17th century were either influenza, typhus or enteric. Medical writers, however, seldom used the term ague but referred to "autumnal intermittents", or some similar nomenclature. By the last quarter of the 18th century malaria was a well recognised disease. Its marked characteristics of high incidence in late summer and early autumn, its association with stagnant water, the relative immunity of natives, its yielding to quinine were all well known. That is not, of course, to say that mistakes were not made in cases of difficult diagnosis or by ignorant practitioners in ordinary cases. But by the end of the 18th century a well qualified doctor would not be likely to mistake an epidemic of malaria for another disease or vice versa. The medical writers of the 18th century believed that malaria had formerly been much more prevalent in England, and particularly in London, than it was in their day. They also believed that a severe form had occasionally appeared. For instance Short (in 1780) in his list of mortalities and epidemics mentions for 1556–58 "agues and Remittents, which consumed much People in *England*, especially grave Men". He also says, "Agues whereof one of 40 of the whole that died of Fevers, died; now scarce 1 of 1100 that die of fevers die of this: This Distemper

. . . has sometimes raged like a Plague. In 1664 they disappeared, and scarce came on the stage before '78; but from 1720 to '29, they and Remittents afflicted the whole Nation grievously; and now as to their Severity, especially theirMortality, they are extinct, but as they decrease, other Fevers increase." Short also quotes an anonymous author as saying "Where are now our . . . great mortalities by agues?" [5]

Burnett in his history of the Reformation says that in the last year of Queen Mary's reign "intermitting fevers were so universal and contagious that they raged like a plague".[6] Bateman says, "Both Sydenham and Morton have left us ample evidence of the frequent occurrence of remittent fevers, which the latter affirms to have been extremely destructive for several years before the great plague, viz. from the year 1658 to 1664. He states, that Oliver Cromwell died of this fever in 1658; and that his own father, who was himself an experienced physician, also died of it; and his whole family, including himself, were infected." [6]

Sydenham has written of the year 1661, "the autumnal intermittents, which during the last few years, had been gaining ground, broke out afresh, the beginning of July. They gathered strength daily: by the month of August they were doing fearful mischief. In many places the mortality was excessive, and whole families fell victims . . . Few were attacked during October. The colds of winter wholly dispelled them."

"The constitution" of the year 1678 "was so favourable to intermittent fevers, that they might again take the name of epidemics. Since the year 1664 they had nearly been banished from London, so that for 13 years they had attacked only a few patients sporadically, or else had been brought up from the country places . . . at the beginning of autumn they were pre-eminently prevalent." [7]

It is possible that the 18th century writers placed too much faith in the powers of diagnosis of their predecessors, and Short's remark as to other fevers increasing is significant in this connection.

Malaria, however, was still endemic in certain districts in England until the middle of the 19th century and the causes

of its final extinction are by no means clear. The disease was associated with stagnant water and there is ample evidence that the draining of the marshes led to a reduction of its incidence. When it was discovered that the mosquito was the carrier of malaria, historians at once jumped to the conclusion that here was the missing link in the chain of causation. Unfortunately for this theory the mosquito *maculipennis* has been found in every rural district in this country where search has been made for it and in many parts of this country its prevalence is greater than in malarious districts in the Tropics. Neither is there any correlation between the number of mosquitoes in an area and the recorded outbreaks of malaria.[8] Yet the correlation between the draining of marshes and the reduction of malaria is historically established by numerous references. Short pointed out the importance of improvements "for Health and Profit, as by draining of marshy Grounds, such as the *Isle of Ely* . . . all the circumjacent Country is hereby made more healthy as well as useful". Before the draining he states the Births were to Burials as 61 to 70, after they were as 60 to 54.[5] The cutting of canals and the canalizing and embanking of rivers often drained the surrounding land and sometimes led to a reduction of the disease. A medical writer on the Stourport district in 1814 says, "Since the introduction of canals and the drainage of bogs, this disease" (intermittent fever) "is never met with here; 40 years ago it was so prevalent, that the farmers could scarcely get their business done for want of hands." [9] Of course not all the unhealthiness of marshy districts was due to malaria. In low-lying, boggy districts drinking water is more likely to be contaminated and rheumatic and bronchial affections are generally more common.

There were other factors besides draining which tended to reduce malaria. An important one was the better and more frequent use of cinchona bark and its active principles. This drug was a native South American remedy, its native name was quina-quina and it was known to the Spaniards in America as early as 1600. In 1638 the Countess of Chinchon, wife of the Viceroy of Peru, was dangerously ill and was cured by cinchona bark. On returning to Spain she brought back a

quantity of the bark with her and its scientific name, *Cinchona*, is due to a mistaken rendering of the lady's name. In 1670 another large consignment was sent to Rome by some Jesuit missionaries and was distributed throughout Europe by the efforts of Cardinal de Lugo, hence the popular name of Cardinal's or Jesuit's bark. About this time the drug received a great advertisement through the Dauphin of France being cured by it, while in England its use was strongly advocated by Sydenham.[4] At first, naturally, it was believed that chinchona would cure all fevers and mistakes were also made in the quantity administered. But by the second half of the 18th century both the limitations and the correct use of the drug had been fairly well learnt. It was available for the poor at the Hospitals and Dispensaries and even the humble apothecary could prescribe it. The alkaloid quinine was not extracted from cinchona until 1820 [10] and was not in use until 1840, and even then was very expensive, and it was not until about 1880 that this preparation was cheap enough to be generally available. Colonel James considers that the free use of quinine proper may have been an important factor in the final extinction of malaria, but even the less effective cinchona bark was of considerable value. The importance of quinine is that it not only reduces the severity of the disease in the person attacked but also so much weakens the parasite that a malarious person saturated with quinine is unlikely to be a new source of infection.[4] It has recently been pointed out by a medical writer that in this country the malarial parasite soon loses its virulence, unless there is a frequent transfer to a new human host. Therefore there is a normal check to the disease during the hibernation in winter. *Maculipennis*, however, is easily domesticated, provided that the right kind of accommodation is available. The mosquito enjoys an absence of draughts, a warm temperature, relative darkness and dark cracks and corners in which to hide during the day, it also requires food at night. An ideal home for a mosquito is the raftered roof of a warm building, with no intervening ceiling to shut it off from its food. The mosquito has no apparent preference between the blood of different animals, cows, pigs, and human beings suit it equally well.

Given the above conditions, the mosquito need never hibernate and she will only leave her home to deposit her eggs in the nearest available stagnant water. In modern times the mosquito finds her ideal home in old fashioned stables, cow sheds and pig-styes, but it has been pointed out that in former times she would have found it in the habitations of man. Here were found the darkness, undisturbed dirt, little ventilation and raftered, unceilinged roofs which she loved. A mosquito which visits a modern house with its inhospitable ceilings and its light and airy rooms soon leaves again. The importance of this change is that the chances of a mosquito biting a malarious person are enormously reduced. Also, hibernation under modern conditions is more common among mosquitoes and therefore this check is more active. It has also been suggested that natural conditions in this country are in some way inimical to the survival of malaria parasites. That is, that without re-infection, the disease in this country either dies out or assumes a very attenuated form. If this is true, the reduction of malaria in this country may have been largely due to a reduction at the old source of infection. Pringle describes a form of remittent fever as endemic in the Low Countries, especially in Zeeland, and malignant malaria still raged there in the early 19th century. During the unfortunate Walcheren Expedition of 1809, out of a total complement of 1,738 officers and 37,481 men, 60 officers and 3,891 men died of disease and in 1810 there were still 11,513 on the sick list. When Blane, who was sent out by the Government to report, arrived at Walcheren he found between nine and ten thousand sick and pronounced the disease to be "the endemic fever of marshy countries", though there were a few cases of typhus. The writer of this account says that "the natives are annually liable to a similar calamity" and that one third of the French army in Flanders was annually cut off by this endemic. A petition was presented to Napoleon upon the great mortality of the French troops at Flushing and he is reported to have answered, "L'homme meurt partout." [11]

Therefore, the improved housing, the use of quinine and the reduction of foreign infection were all factors favourable to the reduction of malaria. Nevertheless, the correlation

between the draining of marshes and its reduction is too well established historically to be summarily dismissed. Perhaps dampness is necessary to the well being of the malaria parasite. But in our present state of knowledge a factor remains unknown.

It is interesting to note that a recent account of the Public Health of Baltimore (Maryland, U.S.A.) points out that almost complete extinction of malaria followed from the covering in of open drains and the draining of marshes in the vicinity of the city, coupled with an increased use of quinine. There was also a cessation of regular trading communications with malarious regions. These measures were effective before the anti-mosquito campaign. The death rate from malaria was inappreciable by 1899 though the anti-mosquito campaign was only initiated in 1910.[12] In Holland, also, the draining of marshes destroyed malaria.

It is of course impossible to make even the vaguest quantitative statement as to the number of deaths due to malaria in this country, especially as the mild form does not kill directly but only renders its victims more susceptible to other diseases. Lind, writing in 1809[13] said that agues occurred in England in low woody and marshy places, that they were seldom mortal to natives but impair the constitution and to strangers they were often fatal. Blane[14] writing in 1812 called attention to the greater mortality in the districts where ague occurred, though whether the higher death rate was due directly or indirectly to malaria is not clear. At Boston (in the fen country) the mortality was 1 in 27 (37 per 1,000), while at Stamford in the upland it was only 1 in 50 (20 per 1,000). Short in 1750 had written that, "Low Habitations especally on stiff Clay, rotten Earth or near a Level with the Sea, great Rivers, Marshes, Lakes or putrid standing Waters . . . Such are the Fens in *Lincolnshire*, the Isle of *Ely*, some Places in *Holderness* of *Yorkshire*, Iles of Lancashire, Washes of *Norfolk*, Hundred of *Essex*, etc.", in these places the burials came near to or were even greater than the christenings, this was due to intermittents and putrid fevers and other diseases. He adds, "Though the Burials in such Places may exceed the Births, yet the Difference between Weddings and Burials, is far from being so wide as might be expected. Then it is evident, that the great Numbers dying in Infancy, are supplied by fresh In-comers, who settle and marry there; and that the Endemics of the Place are more fatal to them than the Natives".[5]

In regard to London, many modern writers are sceptical as to whether the disease ever existed in that city, but the 18th century belief as to its former prevalence cannot be summarily dismissed. It may be noted that the conditions up to the middle of the 18th century were favourable. London was in constant communication with the Low Countries, both in peace and war and, so long as the city was unpaved and the marshes in its close proximity were undrained, there was no lack of breeding places for the mosquito. The housing conditions in the 17th century were also favourable to the disease. The re-building after the Great Fire and the gradual modernization of the houses which survived that catastrophe, would have been favourable to its reduction or extinction. Also, Westminster was paved in 1762 and the City in 1766, "Fleet ditch was then first covered in and the streets paved with large stones",[15] and the marshes near London were drained about the same time. To this cause Lind ascribed the extinction of acute malaria in the Metropolis. A writer in 1781 said, "Very few die now of Ague in London." He added that "towns in general are less harassed with this disease than country places".[16] Pringle had noted the same thing in the Low Countries. Incidentally this seems to prove that these writers were not confusing malaria with typhus or enteric. By the beginning of the 19th century it was generally believed that all forms of malaria were extinct in London, the cases which occurred being among immigrants from Ireland or the marshy districts of England. To the present writer it seems that the balance of evidence is in favour of mild malaria having existed in London up to the middle of the 18th century, at which time it died out owing to the above mentioned improvements. It is impossible to express an opinion as to whether the epidemics of the 17th century were visitations of acute malaria or not. But apart from these very doubtful visitations, it is unlikely that the direct death rate from malaria was ever appreciable in London.

Even mild malaria, however, impairs the constitution and therefore malaria, if it existed, would have been indirectly responsible for part of the high death rate, particularly that of children.

In many marshy districts of this country the existence of mild malaria is an established fact. It died out in the middle of the 19th century, for reasons which are by no means clear and the discussion of which are outside the province of this book. There is a considerable amount of evidence, however, that even by the beginning of the 19th century the incidence of this disease had been much reduced, and though the direct effect upon the death rate was probably unimportant, the indirect effect in certain districts can have been by no means negligible. Its former incidence must also have led to much ill-health and general debility.

There is a popular idea that though the death rate may have been higher in early times yet the population was healthier. This belief has been justified first, by the belief that the predominant medieval diseases killed more quickly than the predominant modern ones and secondly, that epidemic disease killed off the weakly members of the community, especially weakly children. As Farr put it, " where the conditions of existence are unfavourable, and a great proportion of the people are weak, sickly, and doomed to untimely death, a sudden epidemic cuts short their agonies, and purifies the race: it is an amputation of members already gangrened, and falling off by inches; at the same time, however, it carries off a great number of the healthy. If those who had cholera in Paris had been seized by consumption, they would have endured 73,600 years of sickness instead of 158,118 days: the living in the epidemics of the middle ages could not have watched the sick if their diseases had been protracted. In this sense only, epidemics can be looked upon as merciful visitations of Providence, for moderating evils self-inflicted on mankind." [17] The last point is rather obscure, certainly if an epidemic disease with the death rate of plague caused an illness which lasted as long as consumption, the sick could not be nursed and it may be added, the human race could not survive. The reason why tuberculosis kills so slowly arises from the nature of the infection and of the protective organisms

which the human body has developed to deal with it. That is to say, a large proportion of those invaded by the bacillus do not contract the disease and those that do contract it continue to put up a good fight against it. In epidemic diseases the battle is short and sharp both for the community and the individual. If, however, Farr meant that owing to plague, etc., there was a less proportionate amount of tuberculosis among the surviving population it is more than doubtful if this idea is correct. In the first place there does not seem to be any good reason to believe that infectious diseases are beneficially selective, many types of fevers seem to attack and kill the strong and healthy as readily as the weak. But even if the death rate among the attacked is slightly selective, the adverse effect upon the survivors more than compensates for this. Not only is the survivor generally weakened and sometimes permanently disabled, as in the blindness which often resulted from smallpox, but he is left more liable to other diseases, for instance smallpox and dysentery leave a liability to consumption. There is a popular idea that a severe fever is purifying and invigorating to the individual as to the community, a survival of the old idea that the body is naturally full of evil humours, which are better if they " come out ". Doubtless some people do seem better in health after an attack of an infectious illness, but that is probably the result of convalescence rather than of the illness. During convalescence many people enjoy proper conditions as to ventilation, clothing, diet and rest for the only time in their lives. But this is a modern development, it is doubtful if it was true of convalescence in earlier periods.

The losses of an army in battle are not measured alone by the number of killed, but also by the temporarily and the permanently maimed.[18] So it is in the fight against disease, the reduction of the number of deaths from smallpox, typhus, and malaria meant not only a larger population but a more effective one. Apart from the reduction of the number of persons actually ill from these diseases at any given time, there was also a reduction of other specific illness and of general debility and ill health. A high death rate is a clear indication of a high sickness rate.

In spite of its imperfections for the measurement of details, the value of the crude death rate remains unimpaired for the measurement of broad changes in a large population.[19] The infantile death rate has also been held to be a reliable test of social conditions, in spite of the fact that in modern times there is not necessarily a close association between the general and the infant mortality.

Though many factors in modern life are adverse to health, it is undoubted that at the present day there is a less proportion of serious illness and disablement than in previous ages. The legend of our healthy, vigorous ancestors has as little truth in it as the legend of the healthy savage.

CHAPTER XVII

THE PERIOD 1815–1848 [1]

THOUGH the statistical material for England and Wales was growing both in quantity and quality throughout the 19th century, up to 1875 no very exact conclusions can be based upon it. The mere fact that the statistics were becoming more reliable every decade introduced a new possibility of error when they were used for comparative purposes. After 1815 the population continued to grow at a rapid rate, but the rate of growth was already established and there does not appear to have been any outstanding alteration in the birth or death rates. Once the death rate has fallen below the birth rate to any considerable degree, a population will continue to grow without any further alteration of the rates or even in spite of a degree of adverse change. As a well known writer has expressed it, the increasing number of parents can be compared to compound interest, the *rate of interest* remains the same yet the amount of interest increases year by year.

Up to 1846 the Irish immigration was believed to have roughly balanced the emigration from Great Britain to other parts of the world, after 1846 there was a net loss of population by emigration. The increase of population was, therefore, a natural one.

The registered births for the average of 5 years ending 1830 were 1 in 29 (34 per 1000). Taking the deficiency at as least 21% (this is the lowest estimate) the actual birth rate was at least 36 per 1000.[2] In 1851–61 the registered births had risen to 34 per 1000. Part of this rise was certainly due to better registration but there was also a rise in the registered marriages from 7·8 to 8·4 per 1000.[3] There is no data for anything but a crude rate and this rise may perhaps be accounted for by a change in the age composition of the population. The standardized birth