

# The Influence Of Bacteriology And Parasitology On Civilisation

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The study of history and of the rise and fall of civilisations is simple enough if one limits himself to a mere chronicle of occurrences, but as soon as one attempts to detect and trace any specific factor which has initiated events and determined their cause, then, unless one is on his guard, one may be opening the door to the personal factor, inseparable from judgement, and, possibly, to a multitude of errors. Still this is a risk which like so many in life has to be taken. One wonders what would have happened, if anything, if in the beginning Adam had decided it would be too risky to marry Eve. History would lose most of its value if we fail to discover the motive forces which brought about important events. If it is true (and I think it is), that history is the teacher in life this is only so because through seeing what has caused certain events in the past, we can avoid or foster those consequences in the future.

One of the dangers one must guard against in interpreting history is that of reading more into it than it actually contains—in other words that of tracing a logical pattern where there is no pattern at all. There have been wars fought about dynastic successions in which it is difficult to see any logic. Often—far too often in fact—the course of human affairs has been deflected by trifling accidents, even more trivial than the fact that a queen was childless or that a king fell in love with the wrong lady. But there are many cases where the course of history has certainly been determined by certain definite factors whose effect can be traced throughout the fabric for a very long distance. These causes are generally the fundamentals of life, those concerned with food and health and the

basic facts of geography. I believe that one of the most important factors which have influenced and still influence civilisation are the series of discoveries of the causes of epidemic disease which form the subject matter of the twin sciences of bacteriology and parasitology. Some cynic has said that it is safer to read history written by somebody with a known bias, for which one can allow, rather than that by an allegedly impartial author. Therefore I must tell you that I am myself a bacteriologist, but having made that admission I must say I am really convinced of my thesis.

Look at it this way. Up till about the middle of the nineteenth century, humanity had no real inkling of the causes of infectious disease. People knew, of course, that certain diseases were catching, but they did not know exactly why. The operative word there is, "exactly". The knowledge in question is only of value if we can use it to stop disease and to do that it must be detailed, completely accurate and true. Vague knowledge is little better than ignorance. Now since the latter half of the wonderful nineteenth century, thanks to the work of Pasteur, Koch, Roux, Manson, Ross and so many others the causes of disease were discovered and made to yield all their complex secrets. The practical result was that the science of hygiene was born, and we could not only treat disease, which is only important up to a point, but we could prevent disease which is the most important thing in the material world. These were the facts which came to have a most vital bearing on the course of civilisation, for men feel instinctively, and quite rightly, that they have a right to health. Only a potential suicide can

feel differently and the potential suicide is, thank God, only a pathological exception. So long as a minimal standard of living had not been proven to be indispensable to prevent men laying themselves open to disease, the people could not demand it as a right and governments could conscientiously refrain from providing it. So long as the unhealthiness of marshlands was still debatable, one could ignore the necessity of draining them, but it became nothing less than mass murder not to do so after marshland had been proven to be so completely responsible for malaria. Now it is a matter of history that there were a series of such discoveries which made bad housing, badly built towns, deficient feeding, bad industrial conditions stand out clearly as causes which fostered disease which could in the light of the new knowledge be prevented and which therefore had to be prevented. And hence it followed that politicians with any pretence to honesty had to make the health of the people an important part of their platform. Hence the beginnings of modern social reform, the attack on the slums, the factory acts, the health acts, and, in the last conclusion, the whole paraphernalia which we now know as the welfare state—a complex result which Koch and Pasteur could have imagined to follow their often academical investigations only in their more imaginative moments.

Apart from the political application, and perhaps more important than that was the result in the practical and more strictly medical applications. In this sphere bacteriological and parasitological discoveries have been so successful that we do not even realise their astonishing effectiveness. It is difficult for people of the present time, especially those under fifty, to visualise what life was like before the age of the great discoveries. There has been recently—a few years ago — a small outbreak of chole-

ra in Egypt. That country itself and the world in general dashed so sharply to attack and confine the terrible illness, by isolation, treatment and vaccination, that in a matter of days rather than weeks the epidemic was brought under control and eliminated. In the past it would have had to kill thousands before it would eventually have burned itself out. Now this knowledge of how to deal with an illness has made widespread epidemics things of almost purely historical interest. We did have a most forcible and painful reminder of what things could be like when in 1918 there was an epidemic of an illness — influenza — about which our knowledge then was very scanty. Influenza went right across the world, attacked widely, seeming to chose its victims with a special malevolence amongst the young and healthy, and in a few months made more victims than men had made in the terrible war of 1914-1918. We now know far more about 'flu than we did then but that does not mean that in this case we know enough.

A similar situation prevails with regard to poliomyelitis and a few other illnesses. We should also not forget that there are bacteria and viruses at the moment of little or no importance which can throw variants which would be capable of causing serious outbreaks. But, on the whole, it is safe to say that the great pestilential diseases of the past — plague, cholera, smallpox, yellow fever, typhoid, typhus, the dysenteries, the enteric diseases of childhood, malaria, etc. are greatly curbed as causes of mass depletions of the population. We have been least successful, perhaps, with malaria, but still the improvement has been so extensive that it is now a fact that human life has on the average been lengthened by at least 20 years in the last hundred years.

It is also a fact that whereas up to 1850 3 out of every 4 children died be-

fore reaching the age of 5, only 1 out of every 8 did so in 1939, since then I have no doubt there has been further improvement. People are living longer and fuller lives and the effect of applied bacteriology makes itself manifest in rising populations. It is also true that applied bacteriology has vastly improved living conditions amongst plants and animals, in other words among the sources of our food supplies. To give an example, tuberculosis as a disease of cattle has been eliminated in many countries. A curious application of antibiotics has brought about great improvements in the breeding of animals for food. These facts are extremely important — vital in the literal sense of the word.

There are also disturbing facts. If you are going to stop people from dying then a population pressure is going to be set up as in fact it has been. This, of course, is why it is so fortunate that improvement has also occurred in our sources of food. One needs a powerful imagination to trace in all their ramifications the consequences of the new standards of health. We have more people capable of working, and being less harassed by disease they can devote more of their time to the better things in life. We have more old people in the population, but through medical progress old age is becoming less and less of a burden. More and more of the population are in a better state of health. The times are gone for ever when it was expected that every village should have its quota of the halt and the lame and the hunch-backed — many of these conditions probably the result of tuberculosis and poliomyelitis.

One by-product of bacteriological progress has been the effect on war. In the past disease played a vast part in military campaigns. In the Crimean War typhus and cholera played an enormous part. In the Boer War it was typhoid. In

the 1914-18 war it was dysentery, malaria, gas gangrene and typhus especially in the Eastern front.; not because there was not some bacteriological knowledge but because it was incomplete and only half-heartedly applied and also owing to the great difficulties inseparable from warfare. In the last war — 1939-45 — science was put to use by both sides and everybody was fully alive to the dangers and specific prevention, including new practicable measures for stopping malaria, were most effectively taken. It follows that bacteriology at least saved — thousands of lives. Perhaps it lengthened the war — who can tell? But except in prisoners-of-war camps, the expected epidemics did not materialize. A great part of that war was fought in the steaming jungles of South-East Asia, a country in which malaria, yellow fever and exotic types of typhus abound, besides who knows how many diseases as yet unknown. All these could be avoided or have their effects minimised through the newer knowledge of the ways in which disease is spread.

In other parts of the world and under other circumstances we have been less fortunate. In the equatorial regions of Africa and South America the insects have so far successfully contested man's supremacy, through their strange association with some agents of disease, such as the Trypanosome of Sleeping Sickness and the virus of Yellow Fever. Insects live on big game and parasites often live on both, passing part of their life in an insect and part in a vertebrate. It is a curious cycle which seems to work mainly to the parasite's advantage. The net result is that vast tracts of the world's surface are rendered uninhabitable to man or habitable to a very low degree. Life is also made very difficult for the larger vertebrates: Africa could have become another Australia or New Zealand, a rich source of meats, had it not been occupied by disease-bearing

insects. So far we have lost this battle, but at least we now know who is the enemy and can trace him to his unsuspected lurking places — the salivary glands of a fly or the stomach wall of a mosquito. Some day we may triumph in these areas too.

A less serious but interesting result of bacteriological knowledge has been the effect on manners and behaviour. Man has always had an instinct for cleanliness, but it was the discovery that bacteria can be spread through coughing and spitting that have curbed these habits in civilized societies. Hence also the emphasis on cleanliness of hands, cooking utensils, dishes etc., which has finished by turning kitchens into places very reminiscent of operating theatres. And also certain changes in costume, such as the abandonment of headgear amongst school children, wherever the climate allows it. It is also bacteriological knowledge which has taught us why foods decay and how this can be prevented. And from this followed the methods of canning food of all sorts, and the techniques of re-

frigeration which has put Europe within reach of distant sources of food. Even as it is meat is still one of the most desired and the most expensive sort of foodstuffs. Without refrigeration supplies of meat for Europe would be almost unprocurable for a very large proportion of the population. Even the pattern of domestic cookery has changed and many families now keep their food supply fresher by stopping the propagation of bacteria through the use of refrigerators. Milk is another food the supplies of which have been much influenced. Our ancestors who knew no better hankered for milk straight from the cow, or the goat, as the case may be. Now in countries where these animals are known to be diseased only a lunatic drinks milk raw or untreated.

Bacteriology and its ancillary science mycology have also been responsible for the development of the antibiotic drugs. The effects of those on civilisation must in the long run be found to be enormous, but perhaps that is another story.