

The Truth About Bacterial Warfare

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Through a series of strange psychological factors a considerable number of people these days have developed a habit of worrying about real and fancied dangers, a habit which is destroying their delight in living and hampering their energies which are, in fact, more than ever necessary in these hard times. One of the bogeys casting their shadows on human activities is the fear that some nation will wage war by bringing about an epidemic in the country of its adversaries. Such an epidemic would be caused by the dispersal of disease germs, whether bacteria proper, viruses or rickettsiae.

The idea is not new, and in fact somebody once pointed out that bacteriological warfare was used in the siege of Malta in 1565, when the defenders attempted to foul the springs from which the Turkish forces were drawing their water with the faeces of dysentery patients. The attempt does not appear to have been successful.

There are certain general considerations to be made. Firstly, can a disease so spread among a population that it will affect the power of that nation to continue waging war? The answer to that is certainly a positive one. There have been many occasions when naturally occurring disease has determined the outcome of a war. Secondly, is the artificial starting of an epidemic technically possible? One might have hesitated in answering that, but after the construction of the atomic bomb, there is no reason for saying that, especially if the resources of a great power are available, the technique of bacterial warfare is so difficult as to be impracticable. In fact, I believe it is easier than atom-splitting.

In this problem one must be guided not

only by bacteriological but also by epidemiological principles. It is useless to have just a few cases of disease. It is said that in the 1914-18 war the enemy managed to raise the incidence of a certain illness by allowing females contaminated with it to stay behind in some cities which had otherwise been evacuated and which were being occupied by the allies. This did not have any great military value because the disease in question did not spread far enough and soon enough, nor did it kill its victims quickly enough. The disease one would aim at starting therefore would have to be one liable to assume epidemic proportions.

One of the simplest ways of starting an epidemic would be by contamination of food or water supplies. Water, consumed in some way or other by the whole community, is much more open to this danger, and in the 1939-45 war the possibility either of chemical poisons or of bacteria being dropped in the reservoirs was actually considered and guarded against. It does not follow that of a hundred people who drink polluted water a hundred will fall sick, but certainly the percentage will be large enough to hamper very seriously a war-waging community, and if such a bacterium as the vibri^on of cholera is used, the percentage will be very large indeed. The point of great technical importance in these cases is that the typhoid bacterium and more so the cholera germ are hardy enough to withstand adverse conditions.

One bacterium, the use of which has been considered for purposes of war, is the *Pfeifferella mallei*, the causative organism of glanders. Glanders is primarily a disease of horses, but humans can be

attacked, and in acute cases death invariably follows in a week or ten days. This bacterium has often attacked laboratory workers, and when a centrifuge tube broke in a laboratory at Czernowitz, in Austria, many of the persons present were affected. This incident has given some sweet soul the delectable idea of a glanders bomb, and it seems to be technically possible. What is more important is the fact that the virulence of bacteria can be artificially heightened so that a micro-organism which is not normally very dangerous can be made to become so. This is an extremely important principle. Bubonic plague, for example, is not a very serious disease in a clean community. Pulmonary plague, on the contrary, is an extremely dangerous one which spreads very quickly and is very often fatal. It would be possible to select and propagate a *Pasteurella pestis* with a special pulmonary affinity.

The commoner of the diseases which are spread by droplets, that is by the small drops which are expelled while breathing, speaking or sneezing, and which are therefore very contagious, are produced by the type of micro-organisms called viruses. Viruses do not survive very well outside certain conditions which are not likely to occur elsewhere than in a laboratory. This implies the necessity for their introduction into a community of the bringing in of a human sick person to act as a reservoir of infection. Such a necessity, of course, hampers the bacterial warfare machine, but the difficulty is not likely to be unsurmountable.

One rather engaging way (strictly from the amoral technical point of view) of spreading a disease would depend on the use of the plasmodia of malaria. Letting loose a number of infective mosquitoes might be effective — and malaria, especially among a population which provides virgin soil to it, would be fairly crippling to the prosecution of a war. To add a touch of fantasy, one might imagine the

simultaneous dropping into the country either of infected human beings or of infected monkeys, thus ensuring that the cycle of malaria takes place.

Another method of applying bacterial warfare lies in attacking a nation's food-stuffs. Diseases of such food crops as potatoes and wheat could be started by the use of bacteria or of viruses (through the introduction of infected plants). Even the introduction of such cattle diseases as rinderpest are not beyond possibility. By these means a country might be starved almost as effectively as by a siege.

The one feature of bacterial warfare which is likely to limit its use is its very effectiveness. If an epidemic is started which spreads fast and wide enough to be of military use, there is no foreseeing that it would not extend beyond frontiers. Bacterial warfare would be best used, perhaps, between two countries separated by long distances. Even then with modern means of communication there are serious dangers, and in any case, most wars come about between neighbours and not between distant countries. It is difficult to imagine an epidemic decimating France, for example, which would not sooner or later pass into Germany and thus lead to the engineer being hoist with his own petard. I do not believe it practicable for a nation plotting to use a special bacterium to vaccinate its own nationals first to safeguard against this boomerang effect. The immunity which can be so attained is hardly ever strong enough.

Another consoling thought is that at the International Congress of Microbiology at Copenhagen in 1947, at which many of the most distinguished bacteriologists of the world were present, it was resolved and carried unanimously to join with the Society of Cellobiology in "condemning in the strongest possible terms all forms of biological warfare. The Congress considered such barbaric methods as absolutely unworthy of any civilized

community and trusted that all microbiologists throughout the world would do everything in their power to prevent their exploitation." Unfortunately, however, there were not at that congress any representatives of Russia, Japan, Germany and several other countries. Moreover, the resolution was carried by acclamation and there was no discussion. I would have been more certain that everybody really meant to agree if there had been some discussion. But perhaps nobody opposed that motion because anybody would have been ashamed to do so. Maybe in the last resort, it is in this shameful-ness of distorting to war purposes a technique which has so far been solely direct-

ed towards healing and the universal benefiting of mankind that our salvation lies. Maybe human beings are not such idiots as they occasionally seem, after all. Still one cannot be too sure. The drums of war generally drown the voice of reason, and scientists will find some excuse or other, or possibly even some sound logical reason to salve their conscience, and engage in bacterial warfare. Lord Fisher used to say "War is the essence of violence. Moderation in war is imbecility." All the more reason therefore for preserving peace, a thing fortunately very easy of achievement. As Arthur Mee used to say, all we have to do is for all of us to observe the ten commandments.