

EXTENSIONS OF REMARKS

DR. LEDERBERG SPEAKS OUT ON
BIOLOGICAL WARFARE HAZARDS

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OF WISCONSIN

IN THE HOUSE OF REPRESENTATIVES

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Mr. ZABLOCKI. Mr. Speaker, Dr. Joshua Lederberg, professor of genetics at Stanford University and a Nobel Prize winner for his work in biology, recently addressed the Conference of the Committee on Disarmament in Geneva.

In his talk he emphasized the hazards which biological warfare poses to the world and urged that the Conference promptly reach agreement on a ban on the development, production, proliferation or use of biological weapons.

His position parallels that of the U.S. delegation, which has urged that an agreement on biological weapons be reached now, with subsequent work on a total ban on chemical weapons. This approach has been opposed by the Soviet Union, its allies, and some neutrals at the Conference.

It is my hope that Dr. Lederberg's message of urgency will help break down the resistance of Communist and other nations and allow a ban on biological weapons to be concluded at the next session of the Conference.

In the thought that Dr. Lederberg's

become the most efficient means for removing man from the planet. As a student of evolution, and having studied it in the microcosmos with bacterial cultures, I knew that man had no guaranteed place on our earth. He has faced and continues to face natural disasters like the infestations that have wiped out the American chestnut and the European grapevine. To these long-standing threats would now be added new ones, potentially of our own invention.

These past 25 years, in the course of which the world community has reached a certain degree of familiarity with the problems of nuclear power, and has undertaken some of the steps needed to contain it as a servant for rather than against human aims, have seen a sustained, remarkable development of molecular biology. For example, Professor Gobind Khorana recently reported the synthetic assembly of a small gene through chemical operations on DNA components. It will be a step of another order of magnitude to extend this technical capability to the synthesis of small viruses, but this surely will be accomplished within the next decade. This procedure will allow an unlimited range of experimental variations of the genetic structure of different viruses, a process which has many important potential applications for human health. It also offers us the prospect of engineering the design of viruses to exquisite detail. Accomplishments like Khorana's have been possible in a small laboratory on an annual research budget which is miniscule compared to weapons hardware. A serious military investment in this area could be expected to outstrip this already breathtaking pace of advance by many fold.

I could mention many other intriguing scientific advances from my own work and

the intentional release of an infectious particle, be it a virus or bacterium, from the confines of the laboratory or of medical practice must be condemned as an irresponsible threat against the whole human community.

The Black Death, the great bubonic plague that ravaged Europe in the mid-14th century is in fact a well documented historic example of just this process. The plague first entered Europe in 1346 via the sailors, rats, and fleas on the ships that returned to Genoa after having been expelled from Theodosia in the Crimea where the attacking Tartars had catapulted some of their corpses into the Genoese fortifications. This plague which reduced the population of Europe by at least one-third, would of course, almost surely have made its way West sooner or later, the nature of the disease being quite beyond the comprehension of the medical science of that era.

The Black Death in Europe was only one of many visitations of the plague suffered by Europe during the last 2000 years. We do not know why this one should have been so much more disastrous than many others. The progress of a disease in any given individual is subject to many factors of which only a few are well understood. A large epidemic, involving millions of people spread over time and space, is an immensely more complicated phenomenon about which it is very difficult to make accurate scientific predictions. This combination of very grave potential hazard with a high degree of unpredictability is a peculiar attribute of biological weaponry at its present stage of development. This has a great deal to do with the rational doctrine that so far has placed a relatively low value on its military utility.

statement would be of interest to the Members of the House, I am placing it in the RECORD at this point:

REMARKS BY JOSHUA LEDERBERG, PROFESSOR OF GENETICS, STANFORD UNIVERSITY, FOR INFORMAL DISCUSSIONS AT THE CONFERENCE OF THE COMMITTEE ON DISARMAMENT, GENEVA, AUGUST 5, 1970

This is the first occasion at which I have been invited to attend a meeting of this kind. It is also a 24th anniversary of another occasion when I was a young medical student attending my first scientific conference. This was an international meeting at Cold Spring Harbor, near New York, and it could be truly labeled as the birthdate of a new scientific field, the genetics of bacteria and of viruses. My first published work was presented at that meeting and it concerned the discovery, contrary to decades of previous supposition to the contrary, that bacteria were indeed possessed of a mechanism like sexual reproduction which made it possible to crossbreed different bacterial strains. These observations, together with related ones by many other colleagues have gone into the emergence of the most powerful of new methods and insights in experimental biology, going generally under the name of molecular biology.

From the very beginning it was inescapable to me that these new approaches for the understanding and manipulation of living organisms had potential implications for human progress of very great significance. On the one hand molecular biology could increase man's knowledge about himself and lead to revolutionary changes in medicine in such fields as cancer, aging, congenital disease, and virus infections. It might also play a vital role in industry and in agriculture. On the other side it might be exploited for military purposes and eventuate in a biological weapons race whose aim could well

that of others, and fear only that my enthusiasm in discussing these details might outrun your patience in hearing about them. I will be glad to engage later in informal discussions on any aspect of molecular biology that may be of interest to you. I will just mention the discoveries of three methods of modifying the genetic structure of microbes: 1) cross-breeding them through what is, essentially, sexual reproduction; 2) inserting new genes carried by a virus, a process called "transduction," and 3) direct manipulation of DNA as a chemical substance, and reintroducing this into microbial cells.

I deeply appreciate the gravity and importance of the work of this Committee. Its principal significance is, of course, for the security of all the people of the world; and to that it is only a small addition to mention my own moral pre-occupation with whether my own career will have been labeled a blessing or a curse to the humanity from which I spring. This comment may have more force if I offer it as not only a personal testimony but as typical of the dilemma that faces my entire generation of biological research scientists and our younger students at this very moment. I am therefore many times indebted to you not only for your present labors but also for having offered me the privilege of a more personal participation in a process that may yet result in civilizing this branch of science.

For many years BW has been given only incidental attention as a subject of diplomatic discussion; for it seemed to have little bearing on the adjustments of power that were the main work of specialists in foreign affairs. However, BW does have something to do with efforts to reduce the barbarity of warfare. BW stands apart from all other devices in the actual threat that it poses to the health and life-expectancy of every human being whether or not he is politically involved in belligerent actions. In a word,

the present situation thus might provide the most favorable opportunity for international action to regulate the further development and proliferation of BW. I am convinced we know enough about it to have legitimate concern about its future prospects. Until now no nation appears to have staked its security to any significant degree on BW armaments. I would therefore hope this provides a basis for accord. If we wait until BW has been developed into a reliable armament for use under a range of military doctrine, we must all fear that it could then be too late to disengage important powers from their commitment to it.

If I may return to the Black Death, the main barriers that may today keep bubonic plague from being a great threat in advanced countries are: 1) understanding of and the use of quarantine, 2) the suppression of rats and fleas by general urban hygiene, and 3) the use of modern therapy, especially antibiotics, to control the disease. Each one of these barriers could be breached by further technical developments if a substantial effort were to be applied during the next decade to making the plague bacillus into a weapon.

Other infectious agents might be even more adaptable. Some of man's deadliest enemies are viruses which, like yellow fever, are transmitted by mosquitos or other arthropods. These have the advantage, from a military standpoint, that they may not start a potentially retroactive epidemic in areas where the vector insect does not normally abound. It is already evident that such insect-borne viruses could be applied in the first instance by direct aerial dissemination, with little or no further spread from the first wave of infected targets. Recent reports of airborne or pneumonic rabies, a terrible disease, which as you know is normally spread by the bite of an infected dog or other animal, illustrate this possibility.