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THE RÔLE OF IMMUNITY IN THE CONDUCT OF THE PRESENT WAR¹

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When the history of the present great war is written a notable victory over the common enemy, disease, will be recorded as one of the greatest triumphs in this greatest of all conflicts. In all probability this triumphs over disease will also be recorded as the most important single factor in explanation of the stamina and long-sustained man-power of the involved nations; never before in the history of the world have so many men been engaged in combat with such freedom from internal deterioration due to disease not only among the warriors in preparation and at the line of battle, but also among the supporting civilian population; history records many instances of cessation of wars and sieges due to disease among offenders or defenders or both and a remarkable freedom from pestilence in the present conflict has undoubtedly played a prominent rôle in permitting it to reach the dimensions of the greatest of all wars.

This triumph over disease is due in most part to prevention by sanitary measures, specific immunization and improved methods of treatment of the inevitable and unavoidable sick and injured. With the exception of small-pox, in which disease the science of immunity long ago contributed the most important and one essential means of prevention in the form of cow-pox vaccination, sanitary measures embracing the proper disposal of infectious material and the prevention of the spread of infectious diseases by the processes of isolation and quarantine and including the maintenance of individual resistance by proper

¹ Presidential address at the Fifth Annual Meeting of the American Association of Immunologists held at the University of Pennsylvania on March 29 and 30, 1918.

food, work, rest and play, has played the most important rôle, with the science of micro-parasitology and immunity embracing a knowledge of the parasitic causes of so many of the acute infectious diseases and specific immunization of several by means of vaccines and sera, a close second worthy of the division of honor and credit.

Mention has just been made of cow-pox vaccination in the prevention of small-pox; history shows that without this immunological discovery and process great wars would be impossible and particularly one of the present dimensions involving so many countries and millions of men and offering splendid facilities for the rapid dissemination of the virus; the prevention of typhoid and paratyphoid fever by means of active immunization with vaccines while not as successful as cow-pox vaccination, must be credited with a great measure of success in the prevention of these diseases formerly so widely prevalent among armies; certain measures of success which in some instances are quite marked, have also attended the prevention of bubonic plague, bacillary dysentery, cholera and rabies by means of active immunization.

The prevention and treatment of tetanus and diphtheria with their respective antitoxic sera have proven most valuable immunological procedures and particularly so in the prevention of tetanus at a time when the modern earth digging methods of war have widely distributed the bacillus and rendered practically every wound regardless of severity and location a real danger and menace to life; likewise in the treatment of epidemic cerebrospinal meningitis a potent antiserum has proven conclusively that it is the best means of treatment, its free and intelligent use resulting in a considerable reduction in the percentages of death and the disabling sequelae. In the treatment of that dreaded disease, pneumonia, "The Captain of the Men of Death," the science of immunity has contributed a means for the serologic diagnosis of the type of pneumococcus present and prepared a serum for the treatment of type 1 infections which has proven its worth and right to a prominent place in the modern treatment of this disease. Still more recently the science of immunity has pro-

duced for the toxins of the gas-producing bacillus which has played havoc among so many of our wounded heroes in the past and present, a serum that bids fair to prove of value in the prevention and treatment of this dangerous infection.

Immunological reactions are also proving of practical value at the present time in the diagnosis of several diseases and particularly the serological reaction in the diagnosis of syphilis, which disease menaces all peoples at present and particularly in the future, by reason of its wide dissemination and insidious nature rendering all persons regardless of age and sex vulnerable and liable to its attack. Furthermore in the treatment of this "Third Great Plague," the newly developed branch of chemotherapy in the field of immunity, has contributed a most remarkable remedy in the form of dioxydiaminoarsenobenzol or the popularly known "606," and our hopes for the present prevention of syphilis and protection of the future and unborn peoples, resides in large part in the treatment of the infected until they are rendered less infectious even if not completely cured, by the widespread and more free employment of this and other anti-syphilitic remedies. To this end all efforts made to lower its cost and thereby facilitate its use in the treatment of the poor and of large numbers of persons, are to be welcomed as commendable and a work of first rank importance.

Therefore, while the science of immunity has contributed considerable that is of practical value in the diagnosis and treatment of various diseases of particular importance in relation to the present war, much and indeed more, remains to be accomplished of which mention may be made of but a few of the more pressing problems as follows: The discovery of a test of effective natural immunity to pneumonia and meningococcus meningitis, if such immunity exists, comparable to the Schick test for immunity to diphtheria, as a means of encouraging and facilitating active immunization with vaccines in the prevention of these diseases; a test for natural immunity to tetanus, which may be developed along the lines of the Schick test if some means can be devised for removing the danger of the spore; a means of specific immunization against measles, acute anterior polio-

myelitis, syphilis and gonorrhoea and an improvement of our means for active immunization against cholera, plague, dysentery and typhoid fever, not to forget that problem of problems, namely, the discovery of a means of specific immunization and treatment for tuberculosis.

At our meeting last year the Association officially passed resolutions offering to our federal government the services of our members and laboratories in the conduct of our great war; before and since then not a few of our members have enlisted for active duty in the federal service and at least one has given up his life as a sacrifice to duty; many and probably all members of our Association are more or less intimately associated in some work having a direct bearing upon the problems of health and disease and particularly those menacing or likely to menace the health of our armies abroad and at home; to all the Association would hold up in pardonable pride the accomplishments of the science of immunity in the past and wish all God-speed in their work for the present and future for the health and happiness of mankind for all time and everywhere.